



JOURNAL

OF

THE ASIATIC SOCIETY.

No. 46.—October, 1835.

- 1.—*Report on some Inscriptions found at Hammam, on the Southern Coast of Arabia, 1835. By Messrs. T. G. HUTTON, Asst. Surgeon, and Lieut. J. SMITH, of the Palinurus Surveying Vessel.*

[Communicated to the Asiatic Society by the Government of Bombay. See Proceedings, 2nd Sept.]

March 14th, 1835.—The accompanying inscriptions were found in the neighbourhood of *Dís*, a Bedouin town, a few hours distance from *Ras Sharma*, on the southern coast of Arabia.

The natives who came off to the ship represented it as a populous, well-cultivated district, abounding in vegetables and fruits of various descriptions. Having learned from these persons that there were a number of ancient buildings, and some writing in a character unknown to the Arabs, we naturally felt an inclination to make a personal inspection of them; and to effect this with security, Captain HAINES sent our pilot, a native of the place, on shore, to request the Ruling Sheikh to grant us his firman, and a few Bedouin attendants. In reply, a letter was sent off, making a most exorbitant demand of money, rice, copper, and sundry other very useful articles, specifying the individual quantities with much nicety and precision, as a price of his protection. This of course was politely declined; and from a subsequent conversation with some of the party themselves, they appeared not only to regret the exercise of their cupidity, which had deprived them of at least a few presents from the ship, but seemed to be sensibly ashamed of a conduct so much at variance with the hospitable treatment we had universally met with since leaving Maculla.

We left *Sharma* without remarking any thing further than the remains of two water tanks, much resembling in form and structure, those we saw on the summit of *Hasan Ghoráb*. There appeared also to have been a fort and a small town on the point of the cape ; but time had been so active in her work of destruction, that the traces merely were visible. At *Gossyrh*, we were more fortunate, and although the distance was greatly increased, it was deemed desirable to obtain some correct information of a part of the country, which in all human probability may never be visited again under such favourable circumstances, and which promised to prove so interesting in an antiquarian point of view. With the permission of Captain HAINES, Mr. SMITH and myself started from *Gossyrh*, and after a tedious journey of about 15 miles, through a flat, barren country, we halted for the night about 10 p. m. under the ruins of a very old fort. Here we slept, and the following morning commenced our researches. The Bedouins, who attended us, unfortunately knew nothing of either the ruins or the writing ; but having recalled to our recollection the name of a Bedouin, who had been on board for medical assistance at *Sharma*, we inquired for his residence, which he had informed us was in the neighbourhood, and found him exceeding civil and obliging in showing us every thing he considered might be of interest to us. Like all his Arab brethren, he knew nothing but what his own external senses had taught him : and in common with them, he adopted the easy method of accounting for forts, tanks, inscriptions, &c. by ascribing them all to the superior genius of the Feringís, of whom they seem to have entertained a kind of superstitious dread : of course little else than the names of the places could be procured. The fort is called *Hasan el Meimélt*, and from its size, the nature of the materials of which it is composed, and its form, appears never to have been remarkable for its strength or stability. It is now completely in ruins. After traversing great part of the neighbouring country, which is known by the name of Hamniam, we at last came to *Jibul Aaledma*, where we were directed to look for the inscriptions.

About half way up the hill, which we estimated about 200 feet, we came to a spacious cave, on the sides of which, wherever a smooth surface presented itself, we discovered the traces of writing. Most of it was executed in a species of red paint, but in one or two parts, a black composition had been made use of ; by the ravages of time, many of them were nearly obliterated ; but in others, by wetting the surface, and removing the dust which had accumulated, the characters became much more legible, and in one part in particular, the colour became quite brilliant, looking as fresh as though it had been just laid on.

Having discovered and copied those very perfect inscriptions of *Hasan Ghoráb*, we were at once struck with the resemblance they bore to these now before us, and on a more minute comparison, the letters will be found generally to correspond, although there are a few here, which do not present themselves in the former. As it would appear, that the style of writing is now extinct, at least entirely so in this part of Arabia, it becomes a pleasing subject of speculation by what persons they could have been executed. The characters certainly bear a stronger assimilation to the Ethiopic than to any other known in the present day; and consulting the history of Arabia, we find, that prior to the Persian conquest of *Yemen*, under NOUSHIRVAN, the whole of that fertile province was under the sway of the Abyssinians, many of whom having become enamoured of its beauties, permanently settled here. I think such are fair grounds for assuming that these are the remains of that people, especially as we know them to have been an enterprising commercial nation, with talent and qualifications, which fitted them for such design as *Hasan Ghoráb*, from the execution of which the native inhabitants would have shrunk with despair. For a solution of these difficult questions, however, it will be more becoming in us to preserve silence, and leave them to the disposal of persons better qualified by their peculiar studies and more extended information on such points. I may here mention the coincidence of the name *Hasan Ghoráb*, and *Bait Ghoráb*, the fort and house of *Ghoráb*, which latter is one of the most populous and powerful tribes in the neighbourhood of *Hammam*. On questioning one of the tribes concerning the origin of his title, he told us, his ancestors came from *Hasan Ghoráb*, a place, however, only known to him by hearsay. There are now many intermediate tribes between the two places, so that should the information be correct, we may infer that this is merely a branch of the family drawn here by the comparatively fertile nature of the soil over that about *Hasan Ghoráb*.

With respect to the general features of the country about *Hammam*, it wears a most unpromising aspect, there being to all appearance nothing but barren hills; but on entering the ravines and valleys, the scene becomes suddenly changed, and the eye is once more gratified by the visible marks of cultivation and the industry of man. In each corner of the valley may be seen a thriving date grove, and sometimes pretty large portions of grounds, covered with Taam, onions, garlic, sweet potatoes, and a variety of melons and pompions, one species of which is called the "Bortugal," for what reason it would not appear very evident. The Nebek and cocoanut thrive well. After searching about for further curiosities, we left *Hammam* about noon, and instead of

returning direct to *Gossyrh*, we chose a path nearer to the distant range of *Assad*, and after much fatigue, and some little risk, we arrived at the old fort of *Maaba*, about 12 o'clock at night. We were led to make this deviation in consequence of the character we received of the fort from the natives, who informed us, it was composed entirely of hewn stone, and in a high state of preservation; a distant hope too of finding further inscriptions prompted us to visit the place.

In our search for inscriptions, we were disappointed, neither could we learn from the people about, that there existed any. This, however, should not damp a person's ardour in quest of antiquities, as many of the Arabs positively cannot recognize writing when they see it, if it differ at all from the modern Arabic. We saw an instance of this at *Hammam*; having accidentally found a few characters engraved on a stone on the road side, we immediately stopped to take a copy, while the Bedouins anxiously inquired, "why we were writing the stone," as they simply expressed it; and on being informed that we were copying the writing upon the stone, they seemed half incredulous about it. A short time after this, one of them took me to look at a stone on which he said there was some writing; it proved, however, to be nothing but some natural marks on the surface of the rock, and when I told him this, he laughed, and candidly told me he knew no better.

The fort of *Maaba*, to all appearance, has been strong and well constructed, of stones and mortar; though the former are not hewn, as we were informed they were. There are no embrasures for guns, but numerous loop-holes for muskets or matchlocks. The plan of the building seems good for defence, and its position admirably chosen on a rising ground, in the point of convergence of three fertile valleys well cultivated and thickly planted with date groves. It was said, this was one of the castles that defended the market road to *Hadramaut*, where are many others of a similar description. The road still passes under its dilapidated walls. From hence to *Gossyrh* is about five or six miles.

April 1st, 1835.—In prosecuting the survey of the coast, we again heard of some inscriptions about 40 miles to the eastward of *Hammam*. Lieut. SANDERS, Mr. SMITH, and myself, with the concurrence of Captain HAINES, started off for the purpose of copying them, after having previously examined the ruins of *Hasan Mesúnáh*, situated close to the beach, on a gentle insulated eminence. The foundation wall is now all that remains, the stones of which have evidently been hewn, and strongly cemented with mortar. Every thing around bears striking testimony of its antiquity. It has originally served for the protection of a village, the position of which

Inscriptions near Dîo on the South Coast of Arabia.

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12
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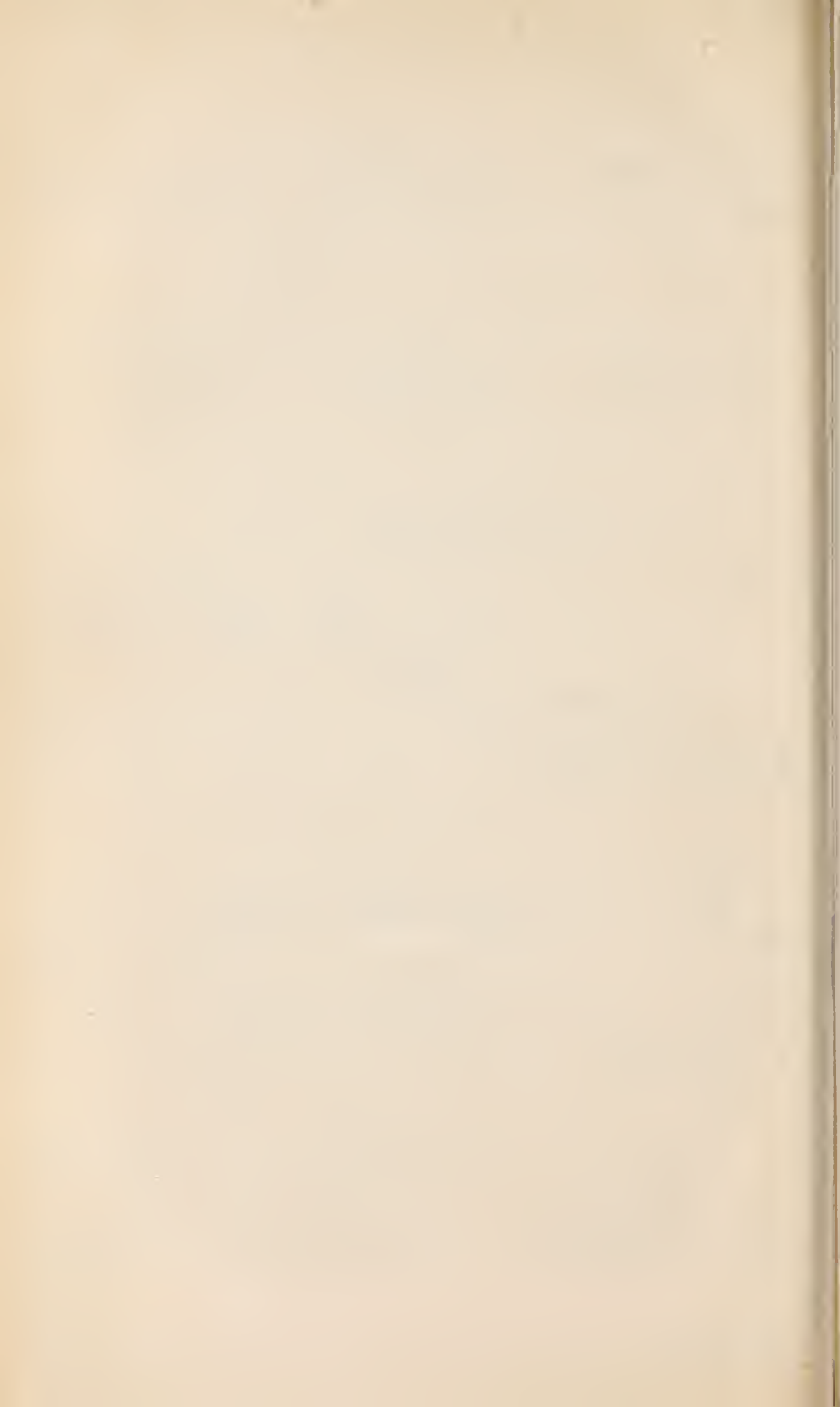
11
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 1 1 1 1 1 1 1 1 1 1
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10
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15
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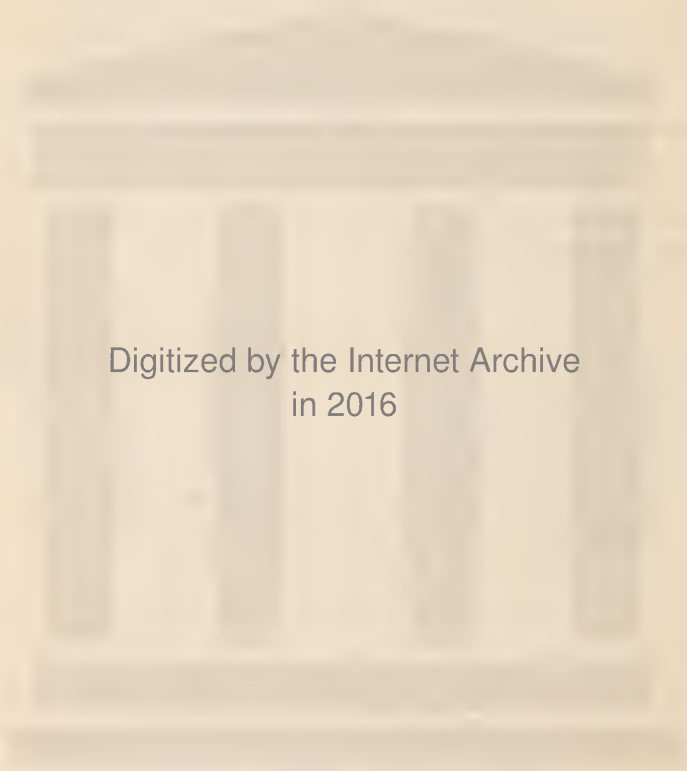
14
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13
 8 0 1 1
 Y A 1 A



Inscriptions E of Hammam on the coast of Arabia.

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<p> ⁷ ɔiɔɫ ɕɫ ɔnɥ̃ɔniɫ11ɫ+ ɔ̃ ɔ̃ ɔ̃+ɔiɥɣ8+n n+ ɫ+ɔni ɔ+ɔ⊕i mɥ̃oɔ̃o </p>	



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can now be inferred only, from the loose dark nature of the soil, and a few small fragments of glass and copper, scattered here and there, so common a circumstance in most of the ancient towns on the Arabian coast.

A walk of about 12 miles brought us on to *Nakhul Mayuk*, a very small date grove, at the foot of the lofty range of mountains a little to the eastward of *Wady Shulkhowi*. Here we began to ascend, and having attained an elevation of about 1500 feet, we came to a spacious cave, in a part of which we found the adjoining characters, written exactly in the same manner with red paint as those at *Hammam*. Immediately underneath is said to have been a well, more probably a small reservoir for water, from its position and the dryness of the soil. It is now filled up with loose stones and rubbish. The surrounding country, with the exception of one or two very small date groves, pressing out from some obscure corner of a valley, is one unvaried scene of barrenness and desolation. We were told, however, that after a fall of rain, the scanty herbage which springs up was a sufficient inducement for the Bedouins to bring their flocks up to the hills, and during which time, they inhabited this and any other caves which they found convenient.

Having slept here for the night, under the protection of a few Bedouins of the Menahil tribe, we started early the following morning, to return by the same dreary path which conducted us on our pilgrimage.

II.—*Account of Súngie Ujong, one of the States in the interior of Malacca. By Ensign T. J. NEWBOLD, 23rd Regt. Madras Light Infantry.*

[Read at the Meeting of the 5th August.]

[The following information, touching the population, customs, amount of produce, boundaries, &c. of the states described, has been principally and necessarily derived from the natives themselves. It is therefore offered with diffidence; but, at the same time, it is to observe here, that fully alive to the disadvantages of such sources, no labor has been spared by me to check and render by collation and patient investigation, such information now submitted, as correct and near the truth as possible.]

The states in the interior, formerly under general sway of the princes deputed from Menangkabowe, are under the immediate government of their respective *Panghúlús* and *Súkús*. As each state has its peculiar features, it would seem advisable to give them a separate notice. By Malays, the precedence is ascribed to Súngie Ujong; the *Panghúlú* of which territory is addressed, by his brethren, by the

appellation of *Abang*, elder brother; the second place is given to Rumbowe, and the third to Johole. Srimenánti, whose claims still remain unsettled, aspires to the fourth place.

Boundaries.—Súngie Ujong is situated towards the source of the right branch of the Lingie river. It is bounded to the north by Jellabú; to the south, by part of Rumbowe and the Lingie river; to the east, by Srimenánti, and to the west, by Salangore. Its boundaries with Jellabú are said to be Búkit Tángoh and Dhúlúkára bander Barangan; with Rumbowe, Búkit A'ngin, part of the right branch of the Lingie river, and Parentian Tingih; with Srimenánti, part of Teráchi and the Páro stream: and with Salangore or Calang, by the river Lángkat, Kobak Kámbang, and Tongal Sejága.

Population.—The population in 1832, was estimated at 3,200 Malays, principally Menangkabowes; and 400 Chinese employed in the mines. Many of the latter have since fled to Malacca, in consequence of the disturbances in 1833. The principal villages are Lingie, (the residence of the *Dattu Múda*, KÁTAS;) Pantei, (the residence of the *Panghúlú*;) Jíhoi, Sála, Linsom, Durian, Tanjong, Rassah, Kopaiyong, Rantou, Síliou, and Jirrah. The Teráchi territory, a portion of which appertained to Súngie Ujong, now claims independence.

Trade.—The trade of Súngie Ujong is principally in tin, which is got at Sála, Sa Márahoh, Battu Lobong, Kayu Arra, and Tímiong. Thence it is brought down to Lingie, and landed at Pankálangs, Cúndang, Durian, and Mangis. It is here deposited in ware-houses, and generally bartered for rice, opium, salt, tobacco, cloths, oil, and shells for making lime, brought up by boats, from $\frac{1}{2}$ to $1\frac{1}{2}$ coyans burthen, which cannot easily ascend higher than this part of the river.

The tin is conveyed by Malay coolies, by land, from the mines, as far as Jíhói; a village estimated at 30 miles from Lingie; and thence to Lingie, by small boats, down the river.

From the following extracts from treaties made by the Dutch, it would appear that they did not neglect to avail themselves of this source to increase the revenue of Malacca.

Article I. of a treaty concluded by the Dutch Governor W. BOELAN in Council, with the chiefs of Rumbowe and Calang, dated Malacca, 24th January, 1760.

“The tin being the produce of Lingie, Rumbowe, and Calang, without any exception, will be delivered to the Company at 38 drs. a bhar of 3 piculs; and this price will always continue, without its ever being enhanced; it will be in the power of the Company to seize and confiscate, and to appropriate for their use, all tin which might be

discovered to have been fraudulently exported from the places above-mentioned."

A profit equal to about 18,000 Spanish dollars is supposed to have accrued to the Dutch annually from this monopoly; which so rigid were they in enforcing, that we find it stipulated in the same treaty, "that no boats or vessels, to whomsoever they may belong, shall be allowed to pass the Company's settlement at Lingie without touching, in order that a search may be made in such boats or vessels for tin; any person attempting to evade these rules, will be liable to have their boats, and the tin which may be found in them, confiscated and sold, and the proceeds appropriated for the use of the Company and the said chiefs." Also, that "no boats or vessels of any description whatever be permitted to proceed from the north to south, or passing from the latter to the former part, or passing the straits of Malacca, without being provided with a pass, on pain of being seized."

During the British Government at Malacca, from 1795 to 1818, the trade fell into the hands of private individuals, principally Dutch and Chinese merchants residing at Malacca. In 1819, the Dutch resumed the monopoly, as we find from the 7th article of a treaty, dated Naning, the 5th day of June, 1819, between the Supreme Government of Netherlands India and Raja ALI, the *Panghúlú* and *Ampát Súkú* of Rumbowe, which runs thus: "Raja ALI, the *Panghúlú* and *Ampát Súkú* of Rumbowe, must give up to Government all the tin from Lingie, Súngie Ujong, Rumbowe, and any place under their authority, without reservation. The Government binds itself to pay 40 Spanish dollars per bhar of 300 catties, or 370 lbs., &c."

On the resumption of Malacca by the English, in 1825, the tin trade relapsed into the hands of the private merchants.

Miners.—In 1828, the number of Chinese miners amounted to nearly 1000 men, who were regularly divided into nine *Kongsis* or companies, each under its respective *Tao-kae*. They were chiefly of that singular fraternity, the *Tian Tay Huay*, or Triad Society, whose mysterious oaths and secret laws appear to be not very dissimilar from those which bound the Carbonari of Modern Europe. Jealousy of their fast increasing power and numbers, or some alleged offence, but more probably the treasure amassed by this brotherhood, (whose property was in common,) led in 1828, to their massacre by the Malays.

In 1830, the mines were again worked by about 400 Chinese, who went up, at the inducement of some Malacca merchants, and continued there until the late disturbances in 1833, when many of them returned to Malacca. The mines at present are but partially worked, and very

little of the tin passes down the river, in consequence of the feud existing between the Rumbowe chiefs and those of Súngie Ujong and Lingie.

The Malays and Chinese employed in the mines were liberally paid. The rate of their wages will shew the difference of value set upon the services of the two classes;—a Chinese being paid at the rate of 5 to 8 dollars per mensem; and a Malay from 3 to 5 only.

From day-break to 7 A. M., they are employed in clearing the mines from the water which accumulates during the night. From 7 to 8, they rest and breakfast. At 8, the process of digging out the earth and ore is commenced. At 11, they go to dinner, and return to work again about 1 P. M.

At 5, their labours cease for the day. No work is done at the periods of new and full moon.

Like their Cornish brethren, the Malay miners are very superstitious. They believe in the existence of a spirit (*Kummang*), who watches over the mines, and whose wrath they are particularly careful not to provoke by work or deed. They have “wise men,” or *Puwángs*, who pretend to be able to ascertain the most favorable spots for sinking a mine, by various spells and charms; these may be compared with the charlatanic wielders of the *virgula divinatoria* in our own “enlightened country.”

Previous to a description of the mines, a short outline of the principal geological features of the peninsula, as far as present imperfect information extends, may not wholly be out of place.

The southern part of the Malayan peninsula and Banca assimilate in geological formation. Dr. HORSFIELD, in his observations on the mineralogical constitution of Banca, observes, that “the direction of the island being from north-west to south-west, it follows not only the direction of Sumatra and the Malayan peninsula, but the large chain of Asiatic mountains, one of the many branches of which terminates in Ceylon, while another traversing Arracan, Pegu, the Malayan peninsula, and probably Sumatra, sends off an inferior range through Banca and Billiton, where it may be considered to disappear.”

This chain of mountains may be considered as the termination of one of those beams or pillars of lofty hills, spoken of by M. DE GUIGNES, in his work on the Huns, as supporting the stupendous edifice, to which he compares the elevated regions of Tartary, comprehending the lofty ranges of *Imaüs* and *Caucasus*; and the dome of which is represented as one prodigious mountain, to which the Chinese give the epithet of *celestial*, down the steeps of which numerous broad and rapid rivers pour their waters.

The Malayan range, as far as has been hitherto explored, is of primitive formation ; principally grey stanniferous granite.

In the gold countries of Tringánu, Pahang, Gominchi, and Mount Ophir, rocks and crystals of quartz are met with. At the southern extremity, and in some parts of Salangore, porphyry occurs.

The islands in the neighbourhood of Malacca, and those off the eastern extremity of the Salangore coast, consist principally of granite and laterite with sienite.

According to Dr. WARD, " The small hills in the neighbourhood of Malacca are formed of a conglomerate, the base of which is clay iron stone, containing imbedded portions of felspar, in a state of decomposition (having all the properties of yellow ochre), and small grains of quartz and iron glance, scattered through its substance.

" The specific gravity of the rock is 2.536 ; when recently dug, it is soft, can be easily cut, and readily stains the fingers ; but after exposure to the air for some time, it acquires such a degree of hardness as to be broken with difficulty : and its durability is shewn by the present state of the ancient buildings, which have stood unimpaired for nearly 300 years.

" In its dry state, it is porous, from the destruction of the ochreous particles by moisture and exposure to the air, resembling old lava in its external appearance.

" In all its properties, it agrees exactly with the rock common on the Malabar Coast, and described by Dr. BUCHANAN under the name of laterite."

The mountains at Penang are also " composed of fine grey granite, and all the smaller eminences are of the same material." " Some of the small hills near the coast are partly formed of the laterite already described when speaking of Malacca ; and Saddle island, at the south-western angle of Penang, is apparently entirely composed of the same ingredient."

At the Carimons, hornstone is found. Mr. MARTIN states, the aspect of the Island of Singapore, (situate on the southern extremity of the peninsula, in Lat. $1^{\circ} 17' 22''$ north, and Long. $103^{\circ} 51' 5''$ east,) to be " low and level, with an extensive chain of saline and fresh water marshes ; in several parts covered with lofty timber and luxuriant vegetation, here and there low rounded sand-hills interspersed with spots of level ground, formed of a ferruginous clay, with a sandy substratum. The principal rock is red sandstone, which changes in some parts to a breccia or conglomerate, containing large fragments and crystals of quartz. The whole contiguous group of isles, about thirty in number, as well as Singapore, are apparently of a submarine

origin, and their evulsion probably is of no very distant date." It may be added, that bouldered pieces of primitive trap are found on the shores of Singapore, though none has hitherto been seen *in situ*.

The range of mountains on the peninsula, as it approaches the equator, diminishes in height. The highest of the Rumbowe and Johor ranges, (with the exception of Mount Ophir,) not exceeding, probably, 3000 feet; while many of those to the north of Kedah are said to be upwards of 6000.

Mount Ophir, a detached mountain, between 30 and 40 miles to the eastward of Malacca, I calculated roughly (by means of the thermometer and boiling water) to be 5693 feet above the level of the sea; its summit is granite. Gold dust and crystals of quartz are found in considerable quantities around its base*.

From information hitherto collected, and inquiries made among the natives, it would not appear that any volcanoes exist in the interior; though the circumstance of numerous hot-springs, scattered over the face of the country, and other indications, sufficiently testify the presence of subterraneous fires. Severe shocks of earthquakes have been felt from time to time, but whether caused by violent eruptions from any of the volcanoes on the opposite coast of Sumatra, or by under-ground explosions there, or in the peninsula itself, is uncertain.

There are hot-springs in the vicinity of Malacca; at Ayerpánnas, and also near Sabáng, and at Lúndi in the Naning territory. I have visited the two former places, and found the temperature of the water at noon of the springs at Ayerpánnas, to be 120° Fahrenheit, and at 6 A. M., 113½°.

The temperature of the hot-springs at Sabáng was found at 6 A. M. to be 110° Fahrenheit. The variation in the former instance is accounted for by the different temperatures of atmosphere at the time of taking the heat. The heat of the springs in both cases, I found to exceed that of the atmosphere by an average of 35° Fahrenheit, in several comparative trials.

At the wells near Sabáng, when the bulb of the thermometer was pushed into the soft vegetable mould at the bottom of the spring, the mercury rose to 130°.

The springs at both places are situated in swampy flats, environed by small hills. They average from 1 to 2½ feet in depth, and are discernible from a distance by the steam and odour that escapes. The water is of a pale bluish green tinge; from the bottom bubbles of air (probably sulphuretted hydrogen) ever and anon find their way to the surface, where they burst.

* See J. A. S. vol. ii. page 497.

Dr. WARD analysed a portion of the water from the springs at Ayerpánnas, and found, that on slow evaporation in a sand-bath, 1000 grains of the water left a residuum of eight grains of saline matter, principally muriate of soda, with a slightly bitter taste, indicating the presence of sulphate of magnesia.

The surface of the peninsula is covered generally by alluvial deposits, rich in ore of tin, and not unfrequently mixed with gold; over this lies a layer of vegetable mould, in which stones or pebbles are seldom found.

In the interior, the land is mountainous, but undulating towards its coasts, shaded by primæval forests, and stored with treasures to the botanist and naturalist; it is almost devoid of plains. The strips of low ground lying in the hollows of the undulations are almost invariably swampy, and are converted into *Sawahs*, or wet rice-grounds, by the natives.

At various places along its western coast are low cliffs, if they may so be termed, of a reddish steatite.

The banks of the most considerable rivers are generally low, swampy, and covered with mangrove, *Nipah*, *Nibong*, and other trees of the same nature.

The bottom is for the most part of mud, except at short distances from the estuaries, where sand banks and coral reefs are often met with.

The tin of the peninsula, and the eastern islands, (particularly those of Junk Ceylon, Lingga, and Banca, which may be styled the eastern Cassiterides,) is diffused over a great geographical extent.

Mr. CRAWFURD observes, that "tin, wherever found, has a limited geographical distribution; but where it does exist, it is always in great abundance. The tin of the Indian Islands has, however, a much wider range of distribution than that of any other country, being found in considerable quantity from the 98° to the 107° of east longitude, and from the 8° north to 3° south latitude."

It has, however, been since stated by Mr. ANDERSON, that tin has been found in considerable quantities much farther north, viz. in the interior of Tavoy, in latitude 12° 40' north; the mines are situated at a place called Sakána, about four days' journey from the city of Tavoy.

It has been affirmed, that tin exists so high as 14° north, in Siam.

The peninsula of the present day, although auriferous, appears not to deserve its appellation of "The Golden Chersonesus," so much as its neighbour, the Island of Sumatra, to which, by the way, there is a tradition, mentioned by the early Portuguese historians, that it was formerly united. Sumatra, by some, has been supposed to be the

Taprobána of the ancient geographers; this Mr. MARSDEN denies, ascribing rather the name to Ceylon, the *Serendib* of Muhammedan writers, and the *Lanca* of the Hiudus; and affirms, that Sumatra was unknown to them, denouncing the descriptions given by STRABO, POMPONIVS, MELA, PLINY, and PTOLEMY, as obscure and contradictory.

Admitting the tradition to be based on truth, it might be conjectured, that the Peninsula and Sumatra, thus united, formed that tract of country known to the Greeks and Romans by the title of "*Aurea Chersonesus*." This might serve in some measure to explain why so extensive an island, and one so rich in gold and spices, the two great desiderata of ancient, and I may venture to surmise, modern days, should have escaped the notice of ancient geographers.

The quantity of gold dust exported annually from the south-west coast of Sumatra and Achin alone, according to MARSDEN and HAMILTON, amounts to 26,400 oz. The former states, that there are no fewer than twelve hundred gold mines in the dominions of Menangkabowe alone; a considerable portion of the produce of which (perhaps one-half) never comes into the hands of Europeans.

The gold of the peninsula, on a rough estimate, amounts to 19,800 oz. annually. It is chiefly got at Ulú Pahang, Tringánu, Calántan, Johole, Gominchi, and Jcleye; Reccan, Battang, Moring, and other places at the foot of Mount Ophir.

A small quantity of iron is found in the interior of Quedah, in the peninsula, and also in Sumatra. Siam and Billiton produce this metal in tolerable abundance.

I do not find that silver is produced in any part of the peninsula; although Perak, from its name, which signifies silver, and which is conjectured by MARSDEN to have been the *Αργυρα* of PTOLEMY, might have been supposed to have derived its appellation from the presence of this metal.

The tin produced annually in the peninsula, including the adjacent Island of Junk Ceylon, is estimated at 34,600 peculs.

According to CRAWFURD, the tin of Banca, produce of 1817, amounted to 35,000 peculs, or $2,083\frac{1}{2}$ tons.

Tin Mines.—The mines are generally excavated on the swampy flats at the base of hills of primitive formation. They average from six to twenty feet in depth, following the streams of ore (*Húlúr bíjí*), which will sometimes run in a horizontal direction to the distance of three miles, according to the nature of the ground. These excavations are termed *Lombongan*. The streams vary in diameter from six inches to eighteen and twenty, and consist of a quantity of small heavy granulated portions of a dark hue, and shining with a metallic

lustre, intermixed with a glittering white sand. The excavations made by the Malays, are more superficial than those dug by the Chinese, as they are too lazy to work the streams, which lie deep.

The strata under which the ore is found are commonly, 1st, a black vegetable mould; 2nd, red clay; 3rd, white clay, with white pebbles, apparently decomposed quartz, and 4th, a bed of shining white sand, called *Passúr bíjí*. Under the ore lies a stratum of steatite, called *Nápal*, or a hard bed of decomposed rock. The native term for the tin ore is *Bíjí tímah*, literally seeds of tin; when melted, it has the name of *Tímah masak*. Crystals of quartz and fragments of micaceous schist are sometimes found among the alluvial earth thrown out.

The soil is carried out by the miners in baskets, suspended at the extremities of a stout elastic bambú or *penága*, which passes across the shoulders. The men are divided into two parties, which work in regular succession, one entering the shaft with emptied baskets, while the other makes its egress, with the filled ones. At Ulu Pondoí, in Naning, and at Jerram Kambing, I am informed, the mines are natural caverns in the rock. The Malays and *Jacoons* collect the ore by the light of dammer torches.

The ore is taken to a stream, conducted by artificial channels, lined with the bark of trees, to the vicinity of the mines, and stirred about with an iron rake, or a *choncole*. The water carries off the sand, small pebbles, and earth, leaving the ore and large stones at the bottom, which are afterwards separated by a riddle and the hand. The ore, thus cleared of extraneous substances, is deposited in the *koppas*, to await the process of smelting.

Smelting or Melanchúr.—The smeltings are carried on at stated periods, twice or thrice a year, according to the quantity of ore collected, and always at night, to avoid the great heat.

The ore and charcoal, (of the *Kompas*, *Kamoui*, or other hard woods,) are gradually heaped up, in alternate layers, in a rude furnace of clay, called a *Bullove*, with an aperture below, to allow the escape of the fused metal. The fire is urged, and the whole mass brought into a glow by a sort of leathern bellows called *Humbúsan*, and sometimes by ruder ones, constructed like an air-pump, and made from the hollowed trunk of a strait tree, with a piston, headed by thick folds of paper. These are called *Kalábongs*.

The Malays for the most part content themselves with the *Tropong*, which is merely a hollow bambú converted into a sort of blow-pipe, and worked by the mouth.

As the heat increases, the melted metal is received into a hole dug in the ground, called the *Telága*, or reservoir; and thence, with the assistance of iron ladles, poured into the moulds.

The tin now assumes the shape of the ingots of commerce, of which there are two kinds common in Súngie Ujong, viz. the *Támpung* and *Kepping* or *Bangka*. The former weighs from half a catty to two catties, and the latter, from fifty to sixty catties; one catty is equal to one pound and three-quarters.

The *Támpung* is generally used by the Malays.

In the furnaces used by the Chinese, 800 *lbs.* of metal may be produced during the course of a night. Those of the Malays seldom produce more than one-sixth of this quantity.

From 100 parts of the ore, it is calculated, from 65 to 77 of pure metal are produced. The ore of Banca yields 58. That of Junk Ceylon, according to an assay made by Mr. BLAKE, 64½.

The water is drained from the mines, if shallow, by means of a channel, leading into a neighbouring stream; but if deep, the *Putáram Ayer* is had recourse to. This hydraulic machine is, I believe, of Chinese invention. The Rev. Mr. TOMLIN, a zealous missionary, gives the following description of it:

“The apparatus is simple, consisting of a common water wheel, a circular wooden chain about 40 feet in circumference, and a long square box, or trough, through which it runs in ascending. The wheel and chain, I think, revolve on a common axis, so that the motion of the former necessarily puts the latter into action. The chain consists of square wooden floats, a foot distant from each other, and strung as it were upon a continuous flexible axis, having a moveable joint between each pair.

“As the float-boards of the chain successively enter the lower part of the box or trough, (immersed in water,) a portion of water is constantly forced up by each, and discharged at the top. At one of the mines we were much struck with the simple but efficient mode of its application. There were three distinct planes or terraces rising above each other. On the middle one was the wheel; the lower was the pit of the mine; from the higher a stream of water fell and turned the wheel, which, putting the whole machine into motion, brought up another stream from the pit; these two streams, from above and below, uniting on the middle plane, run off in a sluice, by which the ore was washed.”

Regarding the smelting of tin, in a recent number of Dr. LARDNER's Cabinet Cyclopædia, (No. 54, pp. 21 and 22,) are the following remarks on the advantages of pit coal over charcoal: “Authorities are not agreed as to the time when pit coal first began to be substituted in the reverberatory smelting houses (of Cornwall) for wood or charcoal, though this is generally supposed to have been about 1680.

“ In the smelting of this (tin), as of other metals, the application of this fuel has been productive of immense advantages ; and such is the perfection to which our metallurgic operations have been carried since the economical introduction of this cheap and plentiful fuel, that the regulations of our custom-house alone prevented the carrying a scheme set on foot some years ago, for the importing of the tin ore from the eastern mines, for the purpose of being smelted in this country, and afterwards re-exported.”

It would appear to have escaped the observation of the author of this article, that the enormous forests which thickly cover the whole of the Malayan peninsula, and the Island of Banca, under the very shade of which the miners may be said to work, furnish on the spot a cheaper and more economical fuel than the coal pits of Newcastle or Whitehaven do to the miners of Cornwall, at the sole expence of the labor of felling them ; setting aside the loss of time, the expence of importation and exportation, and disinclination of the natives to such a scheme. Moreover, according to Mr. CRAWFURD, the cost of producing a cwt. of Banca tin is but 22*s.* 8*d.*, whereas that of Cornwall amounts to 64*s.* 7*d.* The cost of producing a cwt. of the metal in Súngie Ujong is estimated by an intelligent native at 23*s.* The immense natural obstacles in Cornwall, only to be surmounted by the most powerful steam engines, and the unremitting application of all the means human ingenuity can devise, together with the high price of labor, are, however, the principal causes in the enhancement of the cost of production in England.

The time perhaps is not far distant when like ingenuity and similar means will be applied to the unlocking of the hitherto partially developed resources of the East.

According to the best native information, the annual produce of the peninsula, before the late disturbances in the tin countries, was as follows :

<i>Places.</i>	<i>Peculs.</i>
Súngie Ujong,	7,000
Perak,	7,500
Quedah,	600
Junk Ceylon,	1,500
Pungah,	1,500
Salangore, Calang, and Langkat,	2,000
Lúkút,	1,600
States in the interior of Malacca,	900
Pahang,	1,000
Kemaman and Tringano,	7,000
Calantan,	3,000
Patani,	1,000
	<hr/>
	34,600

The discovery of tin in the peninsula cannot be traced, but it is assuredly of ancient date. Part of Perak is said to be the *Temála*, or land of tin, of PROLEMY, and *Cálang*, (a name signifying tin in Malay,) to be the *Malaïou Colon* of the same author, and the *Malaya-Culam* of the Hindus.

The tin mines of Banca are of modern origin, being accidentally discovered, Mr. MARSDEN tells us, in 1710, by the burning of a house; the trade of the peninsula suffered considerably in consequence.

According to Mr. CRAWFORD, (as before stated,) the tin of Banca, produce of 1817, amounted to 35,000 peculs, or $2083\frac{1}{2}$ tons, equal to half the produce of England. But under the management of the Dutch, I am informed, it now scarcely produces half that quantity.

The price of Banca tin is from 16 to $16\frac{1}{2}$ dollars per pecul = $133\frac{1}{3}$ lbs., and of Straits tin, (chiefly from the peninsula,) from $14\frac{1}{2}$ to 15. British block tin, in 1832, was selling at £3 12s. 6d. per cwt.

In consequence of a supposed adulteration of Straits' tin, some specimens of ingots of this metal, rejected at Canton, were sent from Singapore to be assayed at Calcutta in 1831. This was done at the Calcutta assay office, which pronounced the specimens to be of good quality, and perfectly good in a mercantile sense. "Great Britain, (according to Dr. LARDNER's work already quoted,) notwithstanding the productiveness of her own mines, imports upwards of 700 tons per annum of oriental, or, as it is more commonly called, Banca tin, from the name of one of the Malay islands, where it is chiefly obtained. The Malay countries are reckoned the richest depositaries of this metal in the world; and from them, China, Hindostan, and many European markets are chiefly supplied. England exports annually about 2,000 tons of tin, including 400 or 500 tons of that received from abroad." Her produce varies from 3 to upwards of 4000 tons annually.

Revenue.—Besides the *Kapála dágang*, and other sources of revenue previously mentioned, as enjoyed in common by the *Panghúlú Delantye* of the interior states, the *Panghúlú* or *Klána* of Súngie Ujong, and the *Rája adhi Rája* have the privilege of purchasing, at every smelting, from each *bongsal*, three *bhars*, equal to nine peculs, or nine hundred catties of tin, at six dollars per *bhar* less than the market price, and exact a duty of six dollars a month for each mine dug on their own lands.

The *Dattu Múda* of Lingie levies also a dollar per *bhar*, on tin passing down the river.

The *Kapála dágang* is a sort of poll tax on slaves imported into

* See GLEANINGS IN SCIENCE, Vol. III.

the interior, from four to six dollars per head; they are generally *Battaks* from the vicinity of Battu Bára, on the opposite coast of Sumatra, and average twenty annually. They fetch a price from 20 to 60 dollars each; according to age, condition, and sex; a higher value being set on the females.

In addition to these imposts, the chiefs of Súngie Ujong formerly enjoyed the division of a premium paid annually by the Chinese and other merchants of Malacca for the tin monopoly, amounting, it is said, to 2500 dollars; 1000 of which went to the *Dattu Múda*, and 100 each to the three elders of Lingie; 800 to the *Klána* of Súngie Ujong, and the remaining 400 to the *Rája adhi Rája*.

The deputed Menangkabowe prince, it is affirmed by the Rumbowe people, had the right of levying a duty, at Sempong, on the Lingie river, of two dollars per *bhar*, on tin passing that settlement from Súngie Ujong, which was afterwards given up as a subsistence to their *Iang de pertúan Múdas*. In consequence of the disavowal of this claim by the Súngie Ujong and Lingie chiefs, and other causes too long for detail, a war ensued in 1833, and a consequent blockade of the river by the *Iang de pertúan Múda*, SAYED SAABAN, at Sempong, still existing, and by which the trade of Súngie Ujong has suffered very materially.

Government.—Súngie Ujong was ruled, under the *Iang de pertúan Besár*, by a *Panghálú*, three *Súkús*, and a *Rája adhi Rája*. The *Panghálú*, as has been already remarked, owes his title, *Klána Putra*, to one of the kings of Johor. He now refuses to acknowledge the control of the *Iang de pertúan Besár*.

BANDAHÁRA SEKUDAI is supposed to be the first chief invested with this title; and regarding his origin, a long tradition was related to me by the present *Rája adhi Rája*, the abstract of which amounts to this, viz. "In ancient times, one of the princesses of Súngie Ujong having had the presumption to laugh at the naked state of a *Batin* of the Jacoons, incurred his resentment, and was forcibly compelled to follow him through thicket and brake, until moved with compassion, this *sans culotte maître de danse* broke the spell and married her.

"The offspring of this sylvan union is said to be SEKUDAI: from whom descend the *Panghálús* of Súngie Ujong."

In all popular traditions of rude nations, there is more or less of truth to be gathered; and in absence of written and other historical evidence, such testimony ought not to be entirely neglected, and set aside as valueless; though frequently ridiculous, and mingled up with matter known to be incredible and void of truth. We need not instance here the works of the early poets of Greece and Rome.

It is certain, that to this day, in Súngie Ujong, Johole, and Jompole, the twelve *Batins*, or chiefs of the savage tribes, have a considerable share in the election of the *Panghúlús* of these states, though there is not now apparent any permanent mark of connexion, either social or religious, between the Malays and these aborigines.

As *Káfirs* and infidels they are despised by the Malays, but superstitiously dreaded. Converts are made to *Islám*; but slavery, as far as my observation extends, is their lot.

A few years ago, the late *Panghúlú* of Súngie Ujong, *Klána LEHER*, died, leaving two nephews, *KAWAL* and *BHAIR*. It is an ancient custom prevailing in the interior, and, I believe, generally throughout Malayan nations, that when a chief dies, his successor must be elected on the spot, and previous to the interment of the corpse, (which is not, unfrequently, protracted through the observance of this usage to a considerable length of time,) otherwise the election does not hold good*.

The following are the traditional lines, or *Serápa*, in which this custom has been handed down in Súngie Ujong.

سرافا	<i>Serápa.</i>
عمون فند يق لغكهون فندجج	Amar-nia pendék langkah-nia panjang
سده سمف كهندق الله	Súdah Sampei Kahándak Allah
هندق بر قبور دتانه ميره	Hándak berqabúr ditannah mérah
سهاري هيلغ سهاري بر تانم	Sa-hári hílang, Sa-hári bertánnam,
سهاري بر تمبوه سهاري فليهر	Sa-hári ber-tamboh, Sa-hári palihará.

Short has been his life, though long his stride!

When the will of God has arrived,

The grave shall be dug in the red earth :

In one-day lost, in one-day planted,

In one-day sprung up, in one-day cherished.

Now it happened that *KAWAL* was absent at the time of *Panghúlú LEHER*'s death. The three *Súkús* and one of the twelve *Batins* took advantage of *BHAIR*'s being on the spot, elected him, and buried the body of the deceased chief. Against this proceeding, the *Rája adht Rája*, and the remainder of the elective body, the eleven *Batins*, protested; a war ensued, which terminated in 1828, pretty much as it began. *KAWAL*, however, by virtue of the suffrages of eleven out of the twelve *Batins*, and by the support of the *Rája adht Rája*, is generally considered the legitimate chief.

* In consequence of this custom, the present Sultán of Johor's younger brother was elected during the absence of the elder brother, whose claims were subsequently acknowledged by the British.

He resides at Pantoï, a village on the left bank of the Lingie river, about 40 miles from the village of Lingie. I had an interview with him at the latter place in 1833.

His features are regular and pleasing; but their expression conveys an idea of indecision and imbecility, probably increased by the immoderate use of opium, to which he was formerly much addicted; the whole tenor of his conversation and manner evinced plainly how completely he was in the leading strings of his adviser, the wily ΚΑΪΤΑΣ, the *Dattu Múda* of Lingie, who accompanied him.

His dress manifested a disposition to finery, consisting of a gaudy red *báju*, or surcoat, flowered with yellow; a broad crimson sash thrown round his waist, suspending several weapons of Malayan fashion; a *Battik* handkerchief, with the bicornute tie, and a plaid silk *sárong*, resembling the tartan worn by the Highlanders, descending to his knees; underneath the plaid he wore short embroidered trowsers.

In the left-hand slash of his close vest of purple broad cloth, which was lined with light-green silk, and adorned with silk lace and small round buttons of gold filigree, lay a watch of an antique shape, to which were appended a gold chain and seals. He wore his hair long, and it was very palpable to two of the five senses that he, like DEMOSTHENES in the composition of his orations, had not spared the oil in the arrangement of his tresses.

Rája adhi Rája.—Next to the *Panghúlú* ranks the *Rája adhi Rája*. The jurisdiction of this officer is confined to the river, and its navigation. The office and title, as would appear from the inscription on the seal, were renewed or granted to his ancestors by MUHAMMED JALIL, Sultán of Johore, A. H. 1211. (A. D. 1796-7)

The present *Rája adhi Rája* is a young man, of an extremely prepossessing address and person.

Súkús.—There are only three *Súkús* in Súngie Ujong. The *Rája adhi Rája* may be perhaps considered as occupying the place of a fourth *Súkú* in councils.

The functions of the *Súkús* are similar to those already described, as possessed by the former *Ampat Súkú* of Naning*. Their titles are *Dattu Mantri Jumahad*, *Dattu Mendalika*, and *Dattu Maharája Inda*. The tribes, of which they are the heads, are those of Sa Melongang, Bodoanda, and Tannah Dattar.

Lingie.—The village of Lingie proper, in contradistinction to the settlement of Qualla Lingie, which is within the Company's territory, at the mouth of the river, is a dependency of Súngie Ujong.

It is situated high up the right branch of the river, and consisted,

* See page 298 of the present volume.—ED.

in 1832, when I visited the place, of a straggling collection of upwards of 100 houses. The *Pankúlangs* of Pemátang, Passir, Cúndang, Dúrian, and Mángis, may be styled the wharfs of this little entrepôt, for the produce of the Súngie Ujong mines, and the articles brought up for barter. Many of the houses have been pillaged and burnt in the subsequent disturbances.

The establishment of Lingie is of recent date. Between 50 and 60 years ago, six individuals, subjects of Rumbowe, (but originally from Rhio,) removed from Rumbowe to a place on the Malacca coast, between Tanjong Kling and Qualla Lingie, called Kubu Achi, (the fort of Achin;) where, according to local tradition, the Achinese erected a work during one of their expeditions against the Sultán of Malacca. Be that as it may, they had commenced the clearing of the jungle, when one of their number was crushed on the spot by the fall of a tree.

This his companions regarded as a supernatural prohibition to settling there, and quitting the place, passed up the river to the present spot; where, with the permission of the Súngie Ujong chief, they finally established themselves. Their names were HAMAN, MAHMUD, JAHUDDIN, LUBBYE, JUMAN, and KÁDIR ALI.

HAMAN was appointed head of the little colony, by the title of *Dattu Múda*, and his four companions, as elders. Of these only one now survives MAHMUD, who is a hale old man of 70.

HAMAN was succeeded by his son-in-law the present *Dattu Múda* MAHOMED AÁTAS, more commonly called KAÁTAS; and the three deceased elders, by HÁJÍ CÁSIM, HÁJÍ MUHAMMED, and INCHI SALI-HUDDIN. This last chief was killed in the disturbances at the close of 1833.

KAÁTAS, the leading character in Súngie Ujong, is a bony, muscular personage in the prime of life; tall in stature for a Malay, and of erect carriage.

His features are harsh and decided; his dress plain and simple. In character, he is selfish, crafty, persevering, and gifted with some foresight; a quality by no means common among Malays.

He possesses unbounded influence over the weak and sensual *Klána*; and it is said that his ambition extends to the undivided sway of Súngie Ujong, and the monopoly of the duties on tin. The opposition of the Rumbowe chiefs, with whom he is at present at deadly feud, and the Malay popular antipathy to innovation and deviation from ancient usage, or as they term it, the "*Addat Zeman Dhúlú*," the "*Addat Dattu Nenek*," &c. will prove considerable obstacles in the attainment of his wishes.

KAÁTAS has, on various occasions, evinced an inimical disposition to the English government.

The following are copies of the inscriptions on the seals of the present *Panghúlú* and *Rája adhi Rája* of Súngie Ujong, and of the *Dattu Múda* of Lingie.

سنة ۱۲۳۹	سلطان	سلطان
محمد عظامس	محمد جلیل منور نكن	محمد جلیل منور نكن
انچي بندر	كدسوان تر جديج كغد د اتو	كدسوان تر جديج كغد كلان
	مهر اج درج د سوغی او جغ	فتراد كری سوغی او جغ
	سنة ۱۲۱۱	سنة ۱۲۱۱
Seal of KAÁTAS.	Of the <i>Rája adhi Rája</i> .	Of the <i>Panghúlú</i> .

From the dates and inscriptions on these seals, it would appear that the two first were originally granted, or more probably, renewed to their possessors, by Sultán MUHAMMED JALIL of Johor, in 1211 A. H.

The last is of still more modern date (1239), and merely bears the date, name, and assumed title (*Inchi Bander*) of KAÁTAS.

III.—*Journal of an attempted Ascent of the river Min, to visit the Tea Plantations of the Fuh-kin Province of China.* By G. J. GORDON, Esq. Secretary Tea Committee.

May 6th.—Anchored in the evening in the Min river, a short way below a narrow passage, guarded on each side by a fort, and hence named by Europeans, the Bogue, as resembling the entrance to the inner river of Canton. We immediately hoisted out our boat, and prepared every thing for setting out, as soon as the return of the flood, which we expected would be about midnight, would enable us to do so. We determined on trying the western branch of the Min, as laid down in DU HALDE'S Map of the province of Fuh-kín. We took with us one copy of a petition, for permission to import rice, on the same footing of exemption from charges as is granted at Canton, and grounded upon the unusual drought of the regular season for planting rice. Another duplicate we left with Captain McKAY of the "Governor Findlay," to be presented by him to any Mandarin who might come on board to urge the departure of the vessel from the river. As the subject of the petition would require reference to Peking, we calculated, that sufficient time would thus be gained to enable us to accomplish our object. The copy in our own possession would be resorted to only in case of our being intercepted. The delay in its delivery might be attributed to the altered appearance of

the country in consequence of some rain having already fallen, which made it doubtful whether the prospects of the season were so bad as to render the present a favorable occasion for such an application on our part, founded as it was on the assumption that the country was threatened with famine. Captain McKAY was requested to be in no hurry about presenting his copy, but to let all persons understand that he had come with such a petition.

May 7th. At 1 A. M. we left the ship with a fair wind and flood-tide. We were 14 persons in all; namely, Mr. GUTZLAFF, Mr. STEVENS, and myself, the Gunner of the "Findlay," a native of Trieste, a tindal, eight lascars of various nations, Bengal, Goa, Muscat, Macao, and Malayan Islands, and my Portuguese servant, a native of Bombay. Having studied such charts of the river as we possessed, we resolved on turning to the left as soon as we came to the entrance of a river called in them the Chang: its position corresponding with that of the rejunction of the right branch of the Min, as laid down in the Jesuit's Map. Mr. STEVENS kept the look out at the head of the boat, and the Gunner steered, while the tindal sounded. The night was fortunately clear, and by 4 o'clock, we struck off into the western river. This soon widened into a very broad channel, which a little further on seemed to branch into two. That to the left-hand appeared full of shoals, and low sedgy islands, and we accordingly followed that to the right, which appeared still broad and clear. It was on our right, besides, that we had to look for the main stream of the Min. We had not proceeded far before the expanded sheet of water we were proceeding by gradually diminished in width, sending off several small branches in various directions, until at last it dwindled away into a narrow nullah, over which there was a stone bridge. Relying on the strength with which the tide flowed up this creek, as proof that it must lead into some other channel, we struck our masts, and passed the bridge, going on, till we saw reason to believe the reports of the villagers, that there was really no passage into the Min by that course. We accordingly came to, that our people might cook, intending to retrace our way with the assistance of the ebb. Unfortunately, however, the depth decreased so rapidly, that before we had proceeded far, we were fairly brought up, and obliged to wait for the return of the flood. Mr. STEVENS and Mr. GUTZLAFF went ashore to reconnoitre, and satisfied themselves that the branch we had avoided in the morning, was the proper one to be pursued; in which opinion they were confirmed by the villagers. We were unable to get a pilot. To all inquiries as to our destination we replied that we wished to go to Min-Tsing, the next Hín town above Fuhchow.

We bought a few supplies, but had a copper basin stolen while we were aground. The flood began to make at 5½ P. M., but it was 8½ before we got into the right channel. For two hours nothing could be more flattering than appearances; but suddenly the water began to shoal, and we were obliged to come to anchor.

At day light of the 8th, we found ourselves surrounded by sand-banks in all directions, without any visible channel by which we might advance when the tide should rise. One man agreed to pilot us into the Min for five dollars, and then left us. A second agreed for two, taking one dollar in advance, and after accompanying us a short way, made off. At ½ past 9 A. M., Mr. GUTZLAFF landed with the view of engaging some one to show us the way, when all at once a Kwanfou with a gilt knob said he would be happy to be of any use to us; and as the wind was contrary, would assist by towing us with his own boat. Mr. GUTZLAFF accepted his offer. The man appeared to be of the rank of a subaltern officer; such a proffer coming from such a quarter was of a very ambiguous character. He was probably sent to watch our motions, and took this method of defeating our object. We had, however, no alternative; our attempts to engage a pilot had failed, and we had found from experience, that without some guide, we could not advance. Besides, we could cast off from our professed friend as soon as we should see grounds for alarm. In fact, he led us back towards the mouth of the Chang river, and when he came close to a small hill fort, which we had observed the preceding morning, went ashore. We cast off immediately, and went into the Fuh-chow branch, where, after running up a little way, we anchored for the night. A cold drizzling rain made our situation not very comfortable, and what was more, we found ourselves about two in the morning in danger of canting over into deep water, from the fall of the tide, leaving the boat's keel deeply fixed in the mud of a sloping bank.

May 9th.—The tide favoring us at 7 A. M., we got under weigh, followed by a Government boat, and with a rattling breeze, soon reached Fuh-chow-foo. When near the bridge, we anchored, and struck our masts, and then shot through one of the openings with great ease. There were about a score of soldiers drawn up in arms at the bridge, and after we had passed through, four boats with soldiers put off after us. Mr. GUTZLAFF told the people on board, that if they came alongside when we came to an anchor, we would communicate with them. They continued to follow us at a little distance. Soon afterwards we came in sight of a second bridge, when we feared we should have been obliged to dismast; on approaching it, however, we

perceived that the road-way, connecting the piers, had fallen in at two places, through both of which boats under sail were able to pass. We selected what appeared to be the widest, and got safely through; but Mr. STEVENS observed, that the stones, which had fallen in, were but a trifle below the surface, and narrowed the passage so as to leave very little to spare beyond the width of our boat. We were now so far ahead of the war boats, that a fisherman ventured alongside to sell us fish. At $\frac{1}{2}$ past 11 A. M., we came to anchor, that the people might refresh themselves; and the tide having turned against us, we remained at anchor till 4 in the evening. The war boats, in the mean time, came up, and a civil enquiry was brought from one of them as to what nation we belonged, whither we were bound, and with what object. Mr. GUTZLAFF, in reply, stated, that we wished to ascend the river, to see tea plants growing, to talk with tea merchants, and to ramble amongst the hills. No objection was made, but that the river was rapid and dangerous. When we weighed, however, these war boats weighed also, and after we had come to at night, they came up and took their station near us. We weighed early on the morning of the 10th, the drizzling rain still continuing, and the thermometer at 57° ; but having no boats in sight, to serve for our guidance, we thought it better to come to anchor again, and let the people have breakfast; as we weighed, the war boats weighed, and when we again anchored, they too came to an anchor. Before we set out the second time, two other war boats came up, which made at first, as if they intended to run foul of us, but showed no other marks of opposition, and we pushed on. I now reminded my friends of my uniform declaration, that I would not attempt to force my way if any actual resistance was offered, and that I even questioned the expediency of proceeding at all, if we were to be continually under the eyes of the government officers. However, as we greatly out-sailed them, and might possibly wear out their vigilance, we resolved to persevere. As we advanced, we found that none of the boats going up the river would answer our questions, the people sometimes clapping their hands on their mouths, or answering, that they durst not give us any information. After having got a long way ahead of the war-boats, however, we found the people communicative and friendly. We were told of several rapids on the Min river, which could not be passed without a very strong wind, and of other places where the current was not only violent, but the stream too shallow to float our boat. We had in fact already reached a place, where the stream, swollen by the hill torrents, that conveyed the rain, which had fallen during the last 30 hours, was so rapid, that with a light

breeze, and our oars, we were unable to make any way against it, and were obliged to come to an anchor accordingly.

The war-boats, by dint of pulling and tracking, surmounted the obstacle, and did not come to till they were about a mile or upwards ahead of us. We found the people very kind and friendly; but they were soon checked by the appearance of a Kwanfoo, who came to us in a little Sampan, with some loose papers in his hand. He addressed himself to me, but I answered with truth and nonchalance, that I did not understand him: Mr. GUTZLAFF, who stood by, recommended, that little notice should be taken of him; that all communications with the mandarins should be avoided, if possible; and that the papers which he offered, not being in the form of a letter, or otherwise in an official shape, should not be received. The officer then asked some of the people who were on shore near our boat, whether they knew if any of us could speak Chinese. Pointing to Mr. GUTZLAFF, they said he knew a few words, enough to enable him to ask for fowls, eggs, and ducks, which he wanted to buy; and that he spoke about nothing else. One of them was saying something about his distribution of books; but the Kwanfoo was at that moment laughing heartily at the odd appearance of one of our men, and the remark about the books, which was immediately checked by one of the by-standers, passed unnoticed. He still persevered, rather vociferously, in requiring us to receive his papers; when he was motioned to be off. Our Gunner gave the boat a hearty shove with his foot, which decided the movement of the envoy. After it was dark, the people of the village brought us bambús for pulling, with other supplies. The lull of the wind continuing during the night, we distinctly heard much beating of gongs, firing of arms, and cheering in the quarter where the war boats lay; but at day-break of the 11th, we thought we saw them under weigh in advance. A rather suspicious-looking man came to the shore, with a paper which he wished to deliver. We showed no inclination to receive it, and in attempting to throw it into the boat, tied to a piece of stick, it fell into the water, and was lost. Soon after, a simple looking peasant boy showed another piece of paper, which, from its rude appearance, I thought not likely to have come from the authorities, and therefore received and handed it to Mr. GUTZLAFF. It was an intimation, that multitudes of officers, with an army of 9000 men, were drawn up close by, and that there were many tens of thousands of soldiers further on. This was the first decided threat we had of resistance, and it was so grossly exaggerated, that we attached no other importance to it, than that it intimated decided objection to our further advance.

We had already fully resolved on not having recourse to force, unless it became necessary to resort to it, in order to extricate ourselves, if an attempt were made not merely to drive us back, but to seize our persons; and we now proposed to use every exertion to get as far as possible ahead of the war-boats, engage chairs for our conveyance by some inland route, and send back the boat under the charge of the Gunner.

The day being for the first time clear, we were engaged all the morning in baling out and washing the boat; and in cleaning our weapons, much rusted by the wet weather we had hitherto experienced. A breeze springing up a little after 11 o'clock, we hastened to avail ourselves of it, and all our arms were stowed away as speedily as possible.

We had gone on some way ploughing the stream in beautiful style when all at once shot began to fall about us. We deliberated for a moment what was to be done. We believed that retreat would not save us from further firing, as long as we were within its reach, if we would take the practice of the troops at the Bogue as an example of the general rule of the Chinese in such cases; and if we could get out of the reach of their shot by running ahead, we might have time for negotiating. On turning a point, however, the wind failed us, and our enemies pursuing us, the firing became more hot and dangerous than ever. My next idea was to run the boat ashore, and attack the Chinese, but the river was very narrow, and on the opposite bank they had erected a mud breast-work, from which they could fire on us with their small cannon, with full effect; and it would be exceedingly difficult to get at our assailants, on account of the steepness of the bank where they now stood. After receiving a good peppering, we put about; but as I anticipated, they continued to fire upon us: and my servant, with one of the lascars, was wounded, though both slightly, and all of the party had narrow escapes from death. The strength of the current soon carried us beyond their fire, and we were in a fair way of reaching Fuh-chow before day-break of the 12th, when we unfortunately missed our way some time after the top of high-water, at 2 o'clock A. M. At day-break, we found ourselves on high ground, 60 yards from the nearest point of the river. We had nothing for it, therefore, but to wait the return of the tide. Numbers of men, women, and children came about us to sell geese, fowls, and fish. Some amongst the crowd we recognised, as having been amongst those we had seen while attempting the western branch of the river. They noticed the marks of the balls that had passed through the gunwale, or stuck in the sides of

the boat; but this did not seem to make any difference in the friendliness of their demeanour. While we were at breakfast, two boats came up filled with soldiers, who were immediately landed, and one party marched towards our boat, while another was drawn up as a reserve. The officer, who commanded the advance, with several of his men, scrambled into the boat. They were desired by Mr. GUTZLAFF to retire; but not complying, our people were desired to turn them out, which they did accordingly. I collared their officer, and was on the point of tripping up his heels, when he threw himself down, and Mr. GUTZLAFF begging me to leave him to him, I desisted from further violence, though the loud and insolent manner of the man made forbearance not very agreeable. Mr. GUTZLAFF then commenced rating the fellow in such animated language, that he became apparently thunderstruck, having no apology to offer for the rudeness and violence with which he came to execute his commission, which he said was merely to inquire who we were, and what we wanted, and to desire us to be off. Mr. GUTZLAFF informed him that we came to present a petition to the Viceroy, but not having met with an accredited officer, its delivery had been postponed; that we had taken an excursion on the river, in order to see the tea plant; that we had proceeded openly, and avowed our intention without being told; that so innocent an object could never draw on us treatment such as no civilized government would offer to innocent strangers. He then harangued with great energy and effect, on the base, treacherous, cowardly, and barbarous conduct we had experienced on the preceding day, and on our own forbearance in not returning the fire; showing him, that we had plenty of arms, which we had taken for our defence against robbers, and assuring him, that we were not afraid to risk our lives against numbers: but had not come with the intention of making war on the government of the country, and would therefore wait to see whether that government would afford us redress by punishing those villains who had thus without any provocation attempted to take our lives, before having recourse to other means. If justice should be withheld by the provincial government, the case might go before the Emperor, and if punishment were not then inflicted on the guilty, the affair was not likely to end there. Mr. GUTZLAFF's eloquence, with the display of our fire-arms, left the Kwanfoo without a word to say for himself, or for his country. He acknowledged, that we had been shamefully treated; but that he was not of the party, and could not be implicated in their guilt, and promised that we should experience nothing but civility from himself. He received our petition, which he handed to one of

his people to take to his boat, and ordered off the rest of his men. He agreed to assist us in getting off from the field where we lay, and to tow us on our way as far as Mingan—a tower and fort, a short way below the place, where the western branch rejoins the Fuh-chow river. We asked him if there was no way of going down without passing under the bridge of Fuh-chow. He said, there was; and that he would probably take us by that route. We got afloat about 11 A. M., and two or three hours afterwards, recognised our position to be that which we had abandoned in despair four days before. Had we remained where we lay on the 8th, till the flood had made, it would have carried us into the main river, and we should have had one or two days start of the war boats, or perhaps entirely escaped their observation. The Kwanfoo continued on board, except when relieved by an inferior officer from the towing boat, intending, as we presume, that we should appear to be his prisoners. In the afternoon, the wind became very strong, and the fleet ran in towards a large village, where they proposed anchoring for the day. Finding, however, that the bottom was stony, and that there was already too little water for our boat, we refused to remain, and were preparing to set sail, when the officer, who had brought us on, earnestly requested to be taken into our boat again. We received him on board, and were again taken in tow, the other war boats accompanying. At dusk, they wished to take us to another large village; but we pointed out a more sheltered spot, and they took us there accordingly. The officers still remaining on board, Mr. GUTZLAFF was requested to desire them to withdraw, which they did; and as they had been uniformly civil since morning, I sent each of them a pair of blue printed cotton handkerchiefs. It was settled that we should again get under-weigh with the morning's ebb, and that after reaching Mingan, we should pursue our way to the ship, without further attendance. At 10 o'clock P. M., I was surprised by a letter from Captain McKAY, of that day's date; he stated that he had been importuned in the most abject manner, to recal us, as orders had been issued to drive us out; which could not be carried into effect. He concluded that we must by that time have got so far on our way, that before we could be overtaken, we must have accomplished our object. At 1 A. M. of the 13th, we got under-weigh, towed as before; but escorted by a numerous fleet of war junks, one of which carried three lanterns, and the others, one each, on their poops; as all these vessels had to make short tacks in a narrow channel, the sight was rather fine; and when we reached Mingan, a number of rockets were discharged, which had a very grand effect. We had not permitted any Chinese officer to

come on board our boat when we started ; but contrary to stipulation, they now again insisted on coming ; while we showed a determined resolution to resist : on consulting their commander, they were directed to let us go freely. We lost our way however in the darkness of the night, and were assisted by a war-boat in the morning, in recovering it. As we approached the right channel, we found several war junks stationed as a guard. Three or four of them accompanied us for some time, but gradually dropped off. The towing junk too took occasion to make us over to a large open boat, from which we soon afterwards cast off. On passing the forts at the Bogue, we were honored with a salute of three guns from each, as well as from some war junks above, and others below, the forts. At 2 P. M., we got on board the "Findlay." In pursuance of our declared intention, I prepared a petition to the Viceroy, praying for inquiry into the conduct of our assailants on the 11th, and the infliction of adequate punishment upon them for their unjustifiable attempt on our lives. Mr. GUTZLAFF was good enough to put my petition into Chinese form, and have it ready for delivery next morning, in expectation, that as had been the practice hitherto, some officer of rank might come on board. None having arrived, however, I resolved to go on board the admiral's junk, and deliver my petition there, explaining its object to that officer. Mr. GUTZLAFF and Mr. STEVENS accompanied me ; we found in the cabin two messengers from the Viceroy, both of them assistant magistrates, wearing colorless crystal knobs ; two vice-admirals, Tsung-ping knan, one of them, the naval commander-in-chief of this station ; one colonel of the army, Yen-keih, and one Pa-tseang, or subaltern. Having handed to them the petition, one of the messengers wanted to open it ; but on being requested to deliver it to the Viceroy, began to enquire what were its contents. Before coming to that subject Mr. GUTZLAFF adverted generally to our character as foreign merchants, and our wish to import rice. The Chinese assured us that it was from no unwillingness on their parts, that we were not allowed to trade, but that they were obliged to act under the prohibitory orders of the Emperor. As to the importation of rice, the Fú-Tseang at first affected to misunderstand us, as if our application were for permission to export rice to our own country from Fuh-kin. One of the messengers told us, that the Viceroy would give us no answer, when Mr. GUTZLAFF quoted some instances of official replies from head quarters, that made him waive this objection.

Having shewn them the impracticability of efficiently excluding foreign trade from so long a line of coast, Mr. GUTZLAFF urged very

strongly the expediency of rendering legitimate what was now conducted with all the defiance of the laws, and other evils attendant on a smuggling trade already so apparent in Canton. Both messengers assented very readily to the soundness of the advice, adding arguments of their own in a very conciliatory strain, and regretting much that it was against the imperial orders. Mr. GUTZLAFF dwelt particularly on the facility which Fuh-chow possessed for the tea trade : this they fully admitted ; but again the Emperor having confined the trade to Canton, there was really no remedy ; and it was quite in vain attempting to open the trade at this port. Mr. GUTZLAFF then adverted to the murderous attack upon us on the 11th ; of this they at first alleged total ignorance, and then ascribed the attack to the treachery of the common natives. Mr. GUTZLAFF however told them, that it was their officers and soldiers who acted to the best of their ability the part of treacherous and cowardly murderers ; while the poor peasantry had always conducted themselves towards us with the greatest kindness. That we were now come with a petition, calling for redress by the punishment of those assassins, the granting of which was the only means of preventing retaliation ; the lives of peaceful people having been brought into the most imminent danger, which violence justified violence in return, even if we were to take a life for each of our lives that had been so endangered. Here all concurred in reprobating such conduct as we had experienced, and in assuring us, that we should meet with no such molestation from them, trying to put as good a construction as possible on the past. Mr. GUTZLAFF repeatedly requested them to allow the people to bring us provisions ; but to this they turned a deaf ear. As we rose up to come away, the messenger of the Viceroy, to whom I had handed the petition, wished to return it ; but I refused to receive it back. He said he could report what we had said ; but durst not deliver the petition. Mr. GUTZLAFF, however, succeeded in getting him to promise its delivery, by reminding him, that he had been sent hither on our account, and it would be strange, if after all, we should be obliged to carry our remonstrance ourselves to Fuh-chow. This hint had the desired effect. On the afternoon of the 15th, a polite note was sent to the admiral's junk, requesting a supply of provisions, to be procured for us, as the people were prohibited from bringing any thing to the ship. The boat brought back a remnant of a shoulder of pork, a dried cuttle-fish, and four pieces of sugar-cane ; these were immediately returned. Mr. GUTZLAFF was good enough to go on board by another boat, accompanied by Captain McKAY and Mr. STEVENS, to require an explanation of this piece of rudeness ; and to inform them

that if in two days I got no answer to my petition for redress, the consequences would not be imputable to me, but to their government. They at first denied that any thing had been sent; but finding this would not do, they alleged, that the pork and fish were intended for the boatmen, and the sugar-cane for the little lad that steered the boat. No indication of such appropriation was made when the things were put into the boat, so that the excuse was evidently an after-thought. Finding that another admiral, who had arrived in the forenoon, was of the party, Mr. GUTZLAFF again expatiated on the atrocity with which we had been treated. No attempt at defending it was offered. The messenger of the Viceroy said, that the petition had been sent, but he was unable to say, how soon we might expect an answer. At this second meeting, Mr. GUTZLAFF pointed out the freedom with which Chinese subjects were allowed to follow any honest avocation they chose at our settlements, and claimed, on the principles of reciprocity, the accordance of similar privileges in return.

On the 16th, Mr. GUTZLAFF, having found some passages of Chinese law particularly applicable to our assailants, went in the evening to point them out to the mandarins, and for their further consideration, copied them out in their presence, and left the extracts with them. Applications for provisions, and promises to supply them, were renewed. On the 17th, a boat arrived from Fuh-chow, at 8 A. M., and was received by the junks with a salute. A little after, a boat came alongside, and made off again with all expedition, after leaving an open note, stating that the orders of the Viceroy had arrived, and that we ought to go on board the admiral to receive them. Mr. GUTZLAFF wrote in reply, that the person who was charged with the communication of the order was in duty bound to deliver it, and that we expected he would bring it accordingly. This was sent by the ship's boat, which soon after returned with a note, stating that since we were afraid to go on board the admiral's junk, they had made out a copy of the order, not choosing to send the original by the young man whom we had sent in charge of the boat. The half hour that our boat was detained was entirely occupied in framing and copying this note. The paper which they pretended to have copied in that time was a roll nearly six feet in length, which could not have been written in the fair style which it exhibited by the most expert penman in less than a couple of hours. We afterwards compared it with the original, and found that it was written in the same hand, and was in every respect, except in the sealing, a fac-simile of the original. Our second petition accompanied this copy. The intention was no

doubt to cheat us out of the original—an object of some value in the eyes of the Chinese diplomatists, who are always anxious to withhold authenticated papers, for fear of furnishing documents that may some day be brought forward in evidence against themselves—a use to which no unsealed documents can be applied, according to Chinese law and practice. The possession of this copy enabled us to prepare a final communication to the Viceroy, and in order to secure the delivery into our hands of the original, the ship was dropt up with the flood abreast of the junk fleet, and her broadside brought to bear upon them. There were 19 vessels in all on the spot; but all the smaller ones immediately got under-weigh, and passed within the forts. When we went on board the admiral of the station, we learned that the orders of the Viceroy were addressed to the admiral of Haetan, who was on board another junk. He and the envoys from Fuhchow were sent for; but it was some time before they made their appearance. Our host, in the mean time, appearing very uneasy and dispirited, we asked what was meant by saying that we were afraid of going on board his ship. Some of us had been there on each day since our return. It was obvious, that fear of retaliation had prevented him from renewing his visits since we came back; but if we thought it right to retaliate it, we should not have imitated the treacherous and cowardly conduct of his countrymen, but openly brought our ship to fight the whole of theirs, and he must be perfectly aware, that as she then lay she could sink his whole fleet, and destroy every one on board. But this was not our object. The government had implicated itself in the business by inventing such a string of notorious falsehoods in defence of the conduct of its officers, and we should leave it to our Government to obtain for us the redress which theirs refused to our simple and respectful application.—The original letter of the Viceroy and his colleagues having been at last produced and taken possession of by me, I returned the copy sent in the morning. We were promised our supply of provisions as soon as we got under-weigh. The final reply to the Viceroy, along with my second petition, under a fresh cover, were now placed in the hands of the principal envoy, who pressed me hard to receive them back, and even followed me out, as if he intended to throw them after me into the boat. Judging apparently that this would be of no avail, he kept them till evening, and then sent a small fishing boat with them to the ship. The fisherman, however, being warned off, carried them back, and we saw no more of them. On the 18th and 19th, we gradually dropped down to the outer bay. No provisions were ever sent us.

IV.—*Selected Specimens of the Sub-Himālayan Fossils in the Dádupur Collection.* By Lieut. W. E. BAKER, *Engineers.*

The discovery of the existence of fossil organic remains, in the vicinity of the village of *Ráyawála*, and in the *Markanda* pass, has led to the examination of the tract of tertiary hills lying between the river *Jamna* and *Pinjor*. From different points on this line, specimens have been obtained, and the fact of its richness in such relics fully established.

The greater number of the specimens in the *Dádupur* collection, are from the hills lying between the *Markanda* pass and *Pinjor*. The calcareous sand-stone prevalent in these formations has usually appeared as the matrix containing them; an exception, however, occurs in the neighbourhood of *Dádgarh*, where the matrix, instead of sand-stone, is a red indurated marl, in which not only the remains of Mammalia and Reptilia are found, but those of Mollusca also. The native collector reports them to occur together, and along with the shells, produced fragments of bones and vertebræ of Saurians. Having as yet had no opportunity of visiting the place, I can neither corroborate his statement, nor particularise the site of the deposit. The shells appear to belong to fresh water species; they are not abundant, and are generally in a bad state of preservation. The red marl is with difficulty disengaged from the specimens; any attempt to separate the shell from the matrix, being usually at the expence of the epidermis, and too frequently at that of the valves themselves. Nos. 45, 46, 47, 48, (Pl. XLVIII. $\frac{1}{2}$ size,) shew the usual state of the specimens; the varieties are few in number, but the determination of fossil species requires so much experience and nice discrimination, that no apology will be requisite to excuse silence on this interesting point. A selection, which is to be placed at your disposal, will, it is hoped, afford the means of determining the question. The univalves bear a small proportion only to the bivalves, being in the ratio of 1 to 100; it must, however, be remarked, that the quantity hitherto collected being small, the above proportion might be materially affected by an inconsiderable increase to the number of specimens*.

* We have ventured to preface Lieut. BAKER'S enumeration of the principal Sub-Himālayan fossils of the *Dádupur* collection by the above extract from a paper previously drawn up by his friend and coadjutor Lieut. DURAND, on the remains of the hippopotamus of the same field, for the sake of pointing out the locality in the extensive range of lower hills, whence they have been exhumed. Lieut. DURAND'S beautiful drawings, being, from their size, better adapted to the pages of the *Researches*, will, in the first instance, receive publication in

The accompanying plates contain drawings $\frac{1}{4}$ th the natural size of a few of the Sub-Himálayan fossils in the Dádúpur collection, viz. selected specimens of the remains of the horse, the hog, ruminants and carnivora.

To save a lengthened description, and the use of technical terms, with which I am not familiar, as well as for the sake of ready comparison, I have accompanied my drawings of several fossils by those of the corresponding bones of their existing analogues.

I may here remark, that the greater part of the fossil, as well as of the recent bones, were sketched with the assistance of the Camera Lucida, and allowing for the slight errors incidental to that instrument, I believe them to be correct "plans and elevations," if I may use the term, of what they are intended to represent.

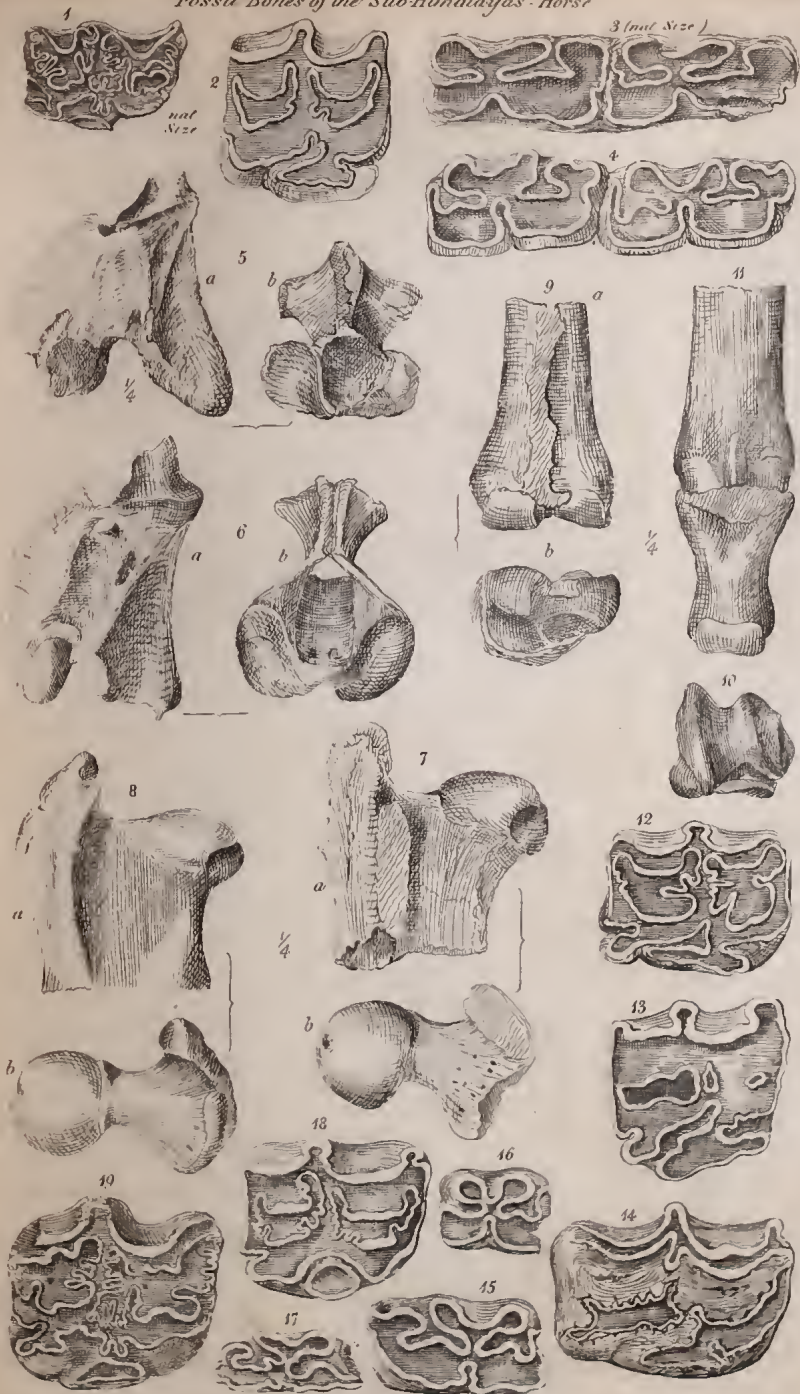
The fossil horse—Pl. XLV. figs. 1 to 19.

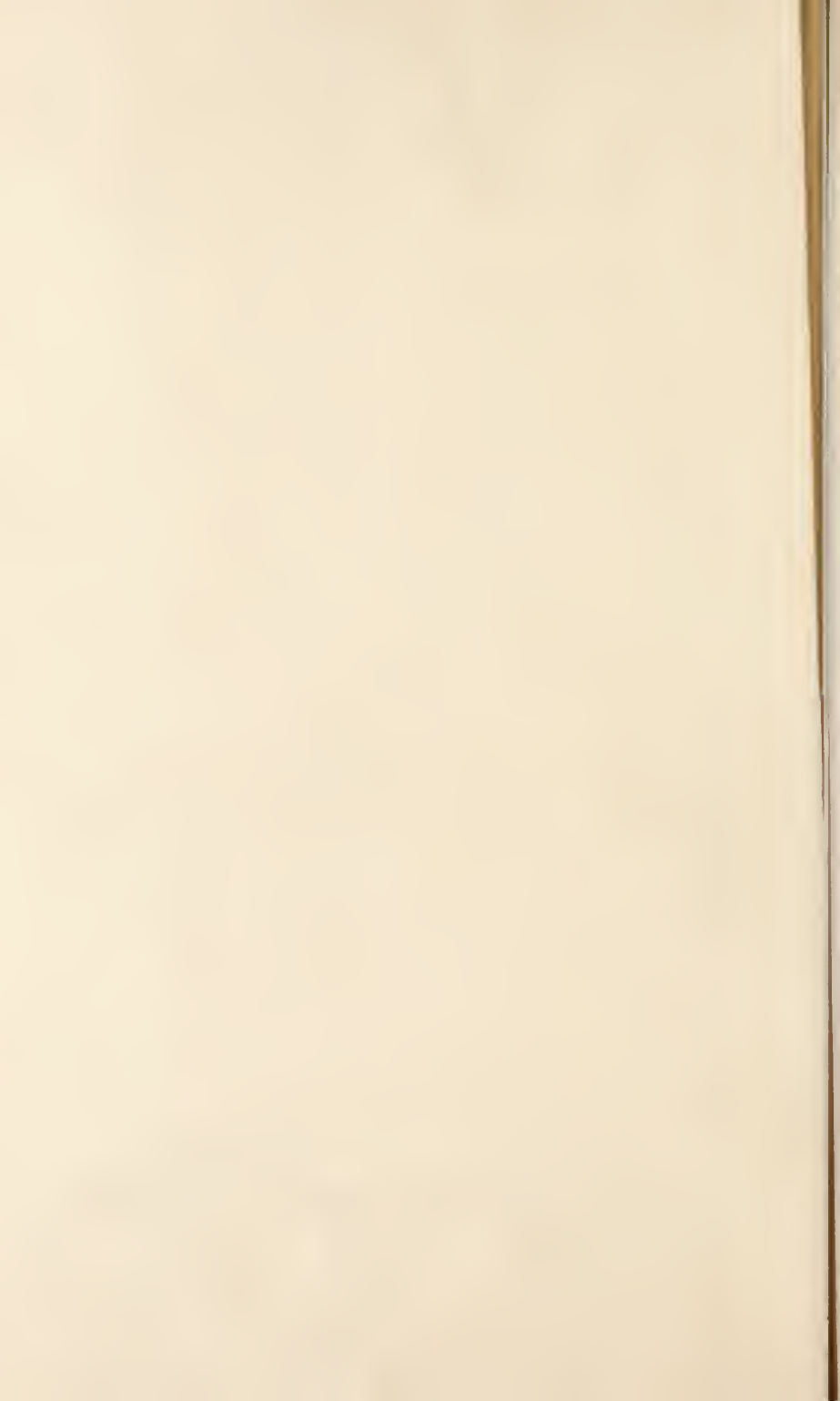
The remains of this animal, now in our collection, are amongst the latest of our acquisitions; and as many of them present a marked difference from the fossil horse, described by CUVIER, which appears not to have been distinguishable from the existing species, I have been induced to figure nearly all our recognized bones of this genus.

Fig. 1 represents a fragment of a left molar of the upper jaw; though a mutilated specimen, it clearly shews the same complicated flexures of the crown, compared with fig. 2, which is the fourth left upper molar of the existing horse. Fig. 3, shews the fourth and fifth molars of the left lower jaw of the fossil, and fig. 4, the same teeth of the volume now in the press, along with the highly interesting description of the *Sivatherium*, by MESSRS. FALCONER and CAUTLEY.

The shells of the red marl, alluded to above, are *perfectly identical*, both in form and state of preservation, with those we received with the collection of Ava fossils from Colonel BURNEY. No drawing is given of these shells in Professor BUCKLAND's account of the Burmese Mastodon, and he remarks, that "neither the insulated concretions from Ava, nor those adhering to the bones, contain traces of any kind of shells;" but on noticing the peculiarities of the tertiary strata in the neighbourhood, he says, "among the most remarkable of these strata is a fresh-water deposit of blue and marly clay, containing abundantly shells that belong exclusively to a large and thick species of *Cyrena*." This doubtless coincides with figs. 45, 46, of our plate:—and further, "also a dark-coloured slaty lime-stone, containing shells which Mr. SOWERBY has identified with some that occur in our London clay. There is also, from the hills opposite Prome, granular yellow sandy lime-stone, containing fragments of marine shells, and much resembling the calcaire grossièr of the environs of Paris." This I presume alludes to the spiral univalve, fig. 44, which I find precisely among Colonel BURNEY's specimens, and which much resembles the principal shell of the calcaire grossièr.—ED.

Fossil Bones of the Sub-Hunulayias - Horse





the recent horse : between these, the difference, though obvious, is less remarkable than in the upper teeth.

The fossil axis, fig. 5, differs from the recent fig. 6, in its greater proportional breadth, and the greater expansion of its lower articulating surfaces, *a. a.*

The fossil femur, (fig. 7,) or rather its upper extremity, has a strong resemblance to the recent fig. 8 ; a slight difference only appearing in the form of the condyle, and the greater flatness in the fossil, of the space between the condyle and trochanter.

In the lower extremity of the radius, (fig. 9,) in the astragal, (fig. 10,) in the metacarpal and phalanx, (fig. 11,) I am unable to detect any distinctive difference from the corresponding parts in the recent horse.

To the above collection, I have since been enabled to add further drawings of the fossil teeth of the horse, to aid in determining whether it exhibit any difference from the existing species.

Figs. 12 to 18, are from specimens in the cabinets of Captain CAUTLEY, with whose permission I send them. Fig. 19, is from a tooth now belonging to Colonel COLVIN, and by him intended for presentation to the Asiatic Society, who will, I trust, excuse the liberty I have taken in drawing it, which I would not have done, had our own specimen (No. 1 of my last sheet) been sufficiently perfect to stand for the type of the species found in the upper formation.

Figs. 12, 13, 14, 15, 16, 17, are from the bed of the Jamna, between Agra and Allahabad.

Fig. 12, appears to be a right upper molar, perhaps the 3rd : this very perfect specimen has a close resemblance to the teeth of the existing horse ; but the flexures of its enamel are undoubtedly more complicated than those of the specimens of horse and ass, with which I have compared them. The pillar, *a*, is also much longer, though the proportions of this part are doubtless affected by the degree of attrition to which the tooth has been subjected, as will be seen more clearly in figs. 13 and 14 ; of which,

Fig. 13, is from the right side of the upper jaw of, apparently, a very old animal ; it may be observed, that the pillar, *a*, is very much enlarged.

Fig. 14, is also from the right upper jaw. I suppose it to be a young tooth, of which the flexures of enamel have not completely burst through the original envelope, and have not been worn down to the usual form : in this, as was to be expected, the pillar is small.

Fig. 15, is the 2nd or 3rd molar of the jaw, right side.

Fig. 16, a fragment of a similar tooth.

Fig. 17, probably the rear molar of the right lower jaw; these three present no remarkable difference from similar teeth of the recent horse.

Fig. 18, is the beautiful specimen from the marl formation in the *Kálawála* pass, alluded to by Dr. FALCONER, in his letter, read to the Society on the 14th January, 1835.

Fig. 19, the 2nd or 3rd right upper molar from the upper or sand formation of the Sub-Himálayas: there is a slight difference between the flexures of enamel of this, and of the fragments, fig. 1, of my own collection, but not more than is perceptible between the several molars of the present horse.

From the above specimens, (if I may be allowed to generalize from so few,) it would appear, that we have three varieties of upper molars of the fossil horse.

1st. From the **lower* marl formation, (*Kálawála* pass,) fig. 18. This tooth is distinguished from the recent, and from the *Jamna* varieties, by the pillar, *a*, being detached from the rim of enamel encircling the rest of the tooth, (as was remarked by Dr. FALCONER,) and from the 2nd (undermentioned) variety, by the comparative simplicity of the flexures.

2nd. From the sand formation, fig. 19.

In this variety also, the pillar is detached, but more elongated, than in the 1st; the interior flexures are remarkably complicated.

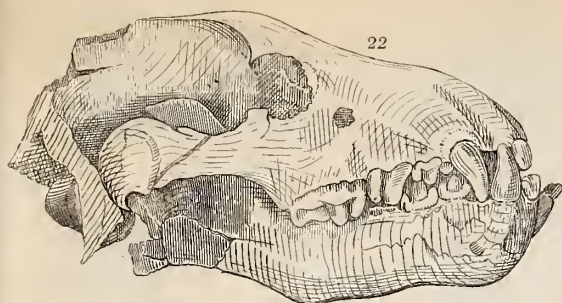
3rd. From the bed of the *Jamna*, between Agra and Allahabad. In this the pillar forms a part of the exterior rim of enamel: in shape it resembles that of the 2nd variety, but the interior flexures are more like those of the 1st. It appears doubtful, whether or not this last variety will be considered identical with the existing species.

Fossil hog—Pl. XLVI. figs. 20, 21.

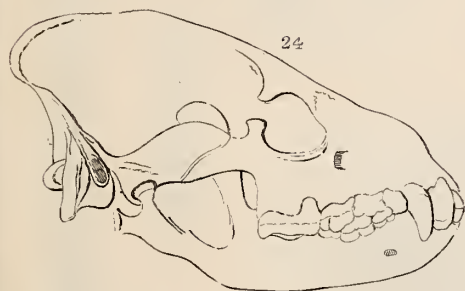
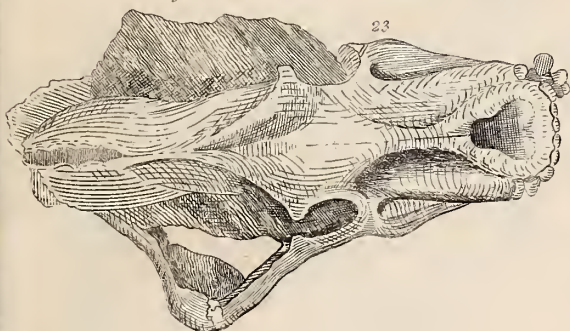
The specimen represented by fig. 20, is in its substance so soft and friable, that it was difficult, without destroying the fossil, to remove even so much of the matrix as enabled me to take the accompanying sketch. It must still remain in doubt, whether the exterior incisors be wanting, or whether they be only concealed under the sand-stone, covering the parts *a, a*. I am myself inclined to the latter supposition, from the close agreement in other respects of this fossil with the lower jaw of a wild sow, lately killed in the *Ráyawála* jungles; in both instances the molars appear to have been very much worn. The comparative sizes of the fossil, and the above-mentioned recent specimen, are 21 and 17.

* An *upper* marl has also been met with, containing shells, and the teeth of crocodiles. See remarks in page 565.

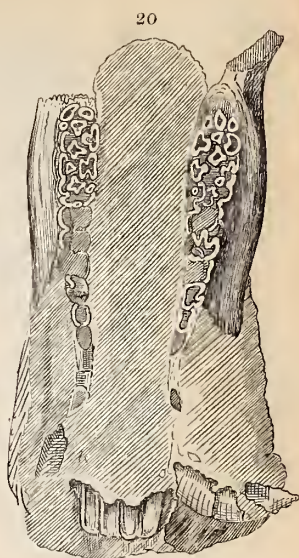
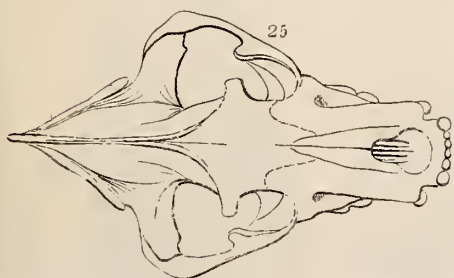
Fossils of the Sub Himalayas - Dadupur Collection



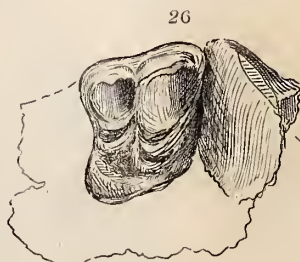
Hyena - fossil



Hyena - recent.



fossil Hog



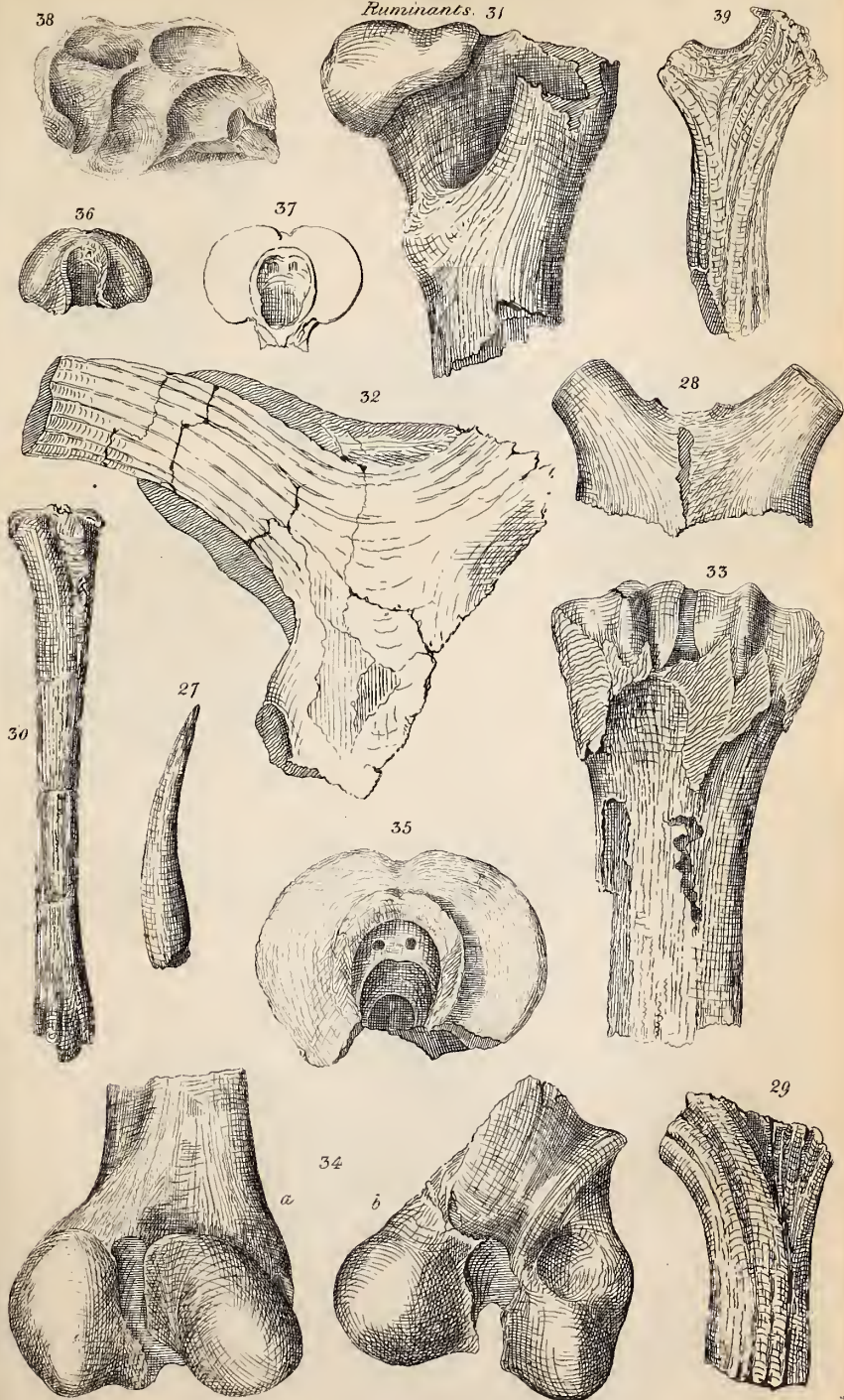
$\frac{1}{2}$ larger than nature

Linear Dimensions - one fourth of the natural size



Fossil Bones of the Sub-Himalayas-Dadypur Collection

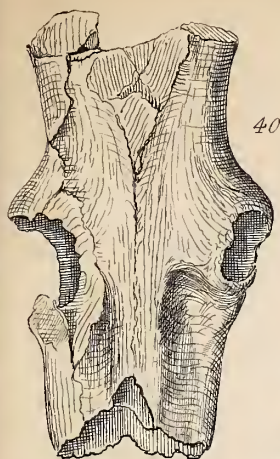
Ruminants. 31



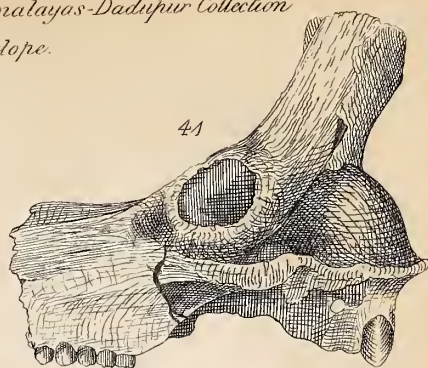
all $\frac{1}{4}$ th the nat Size.



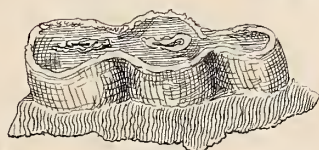
Fossil Bones of the Sub-Himalayas-Dadupur Collection
Antelope.



40

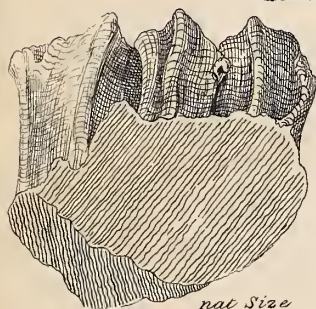


41



43

nat Size.



44

nat Size



42



45



46

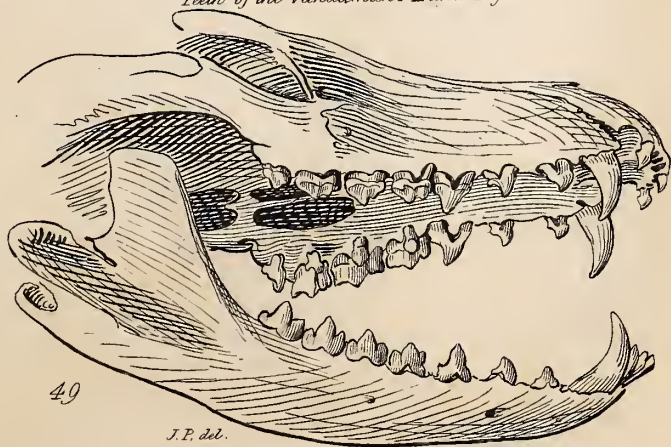


47



48

Teeth of the Vandieman's Land Tiger



49

J.P. del.



The upper part of the femur, fig. 21, must have belonged to a smaller animal; it is chiefly remarkable for the lowness of its trochanter major.

Carnivora.—Pl. XLVI.

Amongst our fossil remains of this family, the hyena is the most abundant. Of other genera, we have one fragment of a head, which even the assistance of CUVIER has not enabled us to name with certainty. We have also a molar indubitably belonging to an animal of the genus canis.

Of the hyena, there appear to be two varieties: figs. 22 and 23, may be considered the type of one; of the other I will say nothing, as the Society will shortly be in possession of specimens of it, now in the collection of Colonel COLVIN.

The skull represented by figs. 22 and 23, is the most perfect fossil we have yet been so fortunate as to meet with. It appears to have been enclosed in the stratum, with the lower jaw in position, but not quite closed. The only injuries which it has sustained are the loss of its left zygomatic arch, a slight displacement of the half of the lower jaw, of which the canine tooth is broken off near its base, and the mutilation of the occiput, which is perhaps the greatest loss of all.

This skull must have belonged to a full-sized animal, as some of the molars are worn flat at the tops: it is smaller than CUVIER's fossil hyena, and somewhat different, though having a much nearer resemblance to it than to the existing hyena of the country of which I have given the skull, figs. 24 and 25. With reference to the latter skull, I have to remark, that it was brought from the lower hills in this neighbourhood, and said to belong to the *charakh* چرخ or hyena; it however wants the small first molar of the upper jaw: and in the disposition of the molar teeth of the same jaw, slightly differs from another less perfect skull of a hyena, with which it has been compared. Whether or not these differences may be attributable to age (for the individual was evidently a very old one), or to accident, I cannot determine.

Fig. 26, is the fifth, and part of the fourth left upper molar of a canine animal.

Ruminantia.—Pl. XLVII. XLVIII.

Of this order we possess a great diversity of species, of which some individuals appear to have been of gigantic dimensions, as may be judged from the specimens which I have selected to illustrate this point.

Figs. 40, 41, and 42, are different views of a skull of an animal allied to the antelope; the length and narrowness of the face, the

height of the nose, and the peculiar setting on of the horns, are all more conspicuously exemplified in another specimen of a similar skull, which Colonel COLVIN purposes presenting to the Asiatic Society. Our specimen, however, has the advantage of possessing the cranium and occiput entire.

Fig. 43, is the last molar of the left lower jaw of an antelope or goat.

Fig. 27, a horn, perhaps of a similar animal.

Fig. 28, part of the frontal of a small stag.

Figs. 29 and 39, ditto antler ditto.

Fig. 44, milk molar of a stag.

Fig. 30, tibia of a stag or antelope.

Fig. 31, fragment of head of a femur of bos.—This specimen, compared with the similar part of the domestic buffalo, is in size as 5 to 4.

Fig. 32, fragment of head of a bos.—This has a general resemblance, as far as it goes, to the very perfect one offered to the Society by Mr. DAWE.

Fig. 33, lower extremity of the metacarpal of a ruminant : compared with that of buffalo, as 83 to 45.

Fig. 34, *a, b*, two views of the lower extremity of the femur of a bos, one-third longer than the longest of which I have met with a description in CUVIER ; its width across the condyles is 6·2 inches.

Figs. 35 and 36, are two similar fragments of axis, which I have selected to show the diversity of size of our fossil ruminants : to complete the comparison, I have added the corresponding bone of the small plough bullock of the country, fig. 37.

Fig. 38, is a lower extremity of a radius, compared with the corresponding bone of the bullock, as 18 to 7·5.

It is not impossible that some of these large bones may hereafter be found to belong to Capt. CAUTLEY's *Sivatherium**.

Seharanpur, July 9th, 1835.

* *Sivatherium*.—The name given by Capt. CAUTLEY and Dr. FALCONER to one of the recently discovered fossil animals, of which their description has just been published in the Society's Researches. We shall take an early opportunity of republishing the account of this important discovery, so fraught with interest to the geologist and the naturalist.

It will be seen by the extract of a letter from Captain CAUTLEY, read before the Society at the Meeting of the 4th November, and published with the present number, that this conjecture is completely confirmed ; and that other animals, particularly the *Anoplotherium* of CUVIER, have been added to the growing catalogue of *Sewálik* fossils.—ED.

*V.—*List of Fossil Specimens from Bilwan, and from the Betwá, collected by Lieut. VICARY, in December, 1834.*

Right branch to the 13th tooth of the lower jaws of a crocodile, I believe the muggur (*magar*); all the alveoli are empty, except the 7th, which contains a germ.

The scapula, part of a rib, and another bone of the same animal: all found together within 300 yards of the *Bugowtí*, about a mile to the N. W. of the village of *Bilwan*, between *Mirzapur* and *Chunar*: they were bedded in clay, mixed with *kankar* and some shells like those of the river; the clay rests on sandstone, which was exposed in the bottoms of the water-courses.

A bone, found on the surface, at the same place.

From the Betwá in Bundelkand, January, 1834.

Bones of a bovine animal, found imbedded in cemented gravel, on the right bank of the *Betwá* river, about one mile east of *Jelálpur*, between *Kalpi* and *Keitah*.

No. 1.—Clay on which the gravel rests, and which forms the bed of the river on that side.

No. 2.—The cemented gravel in which I found the bones, at this place; it is about twenty feet in thickness. Half a mile nearer to *Jelálpur*, it decreases to two feet; and in some places, is very slightly cemented.

No. 3.—The bones: some had fallen to the base of the gravel, and were lying on the surface; others were still firmly imbedded, and broke in the effort to get them out. (I had not a hammer with me.)

No. 4.—Stems or roots? (Dendritical *kankar* perhaps,) above the gravel; in a light colored clay, of about four feet in thickness.

No. 5.—Plate *kankar*, alternating two or three times with the above clay, containing shells not differing from those of the river, and often perforated by the roots?

a. A thin seam, resting on sandstone in the *Sonar* river, at the waterfall near *Hatta*, containing shells (recent).

b. A bone from the left bank above the same fall.

c. A bone from the *Byarmi* river.

* This paper was accidentally mislaid, when the article on the Jamna fossils, of the last No. was in the press. It is referred to in page 502 of that paper, and is here printed both to illustrate the remarks there made, and to preserve the record of Lieut. VICARY'S donation. The *Mirzapur* site of fossils is new, and deserves further examination. In regard to the theory of the Jamna fossils being derived from the *Betwá* river, Mr. DEAN has pointed out to us that *Karim Khán* is 20 miles above the junction of that river.—ED.

VI.—*Note on Thylacinus Cynocephalus. Extracted from the Osteological Section of the Catalogue of the Museum of the Asiatic Society. By J. T. PEARSON, Esq.*

Class—MAMMALIA. Order—Carnassiers. Fam.—Marsupiated. Gen.—Thylacynus. Sp.—Thylacynus Cynocephalus.
Van Diemen's Land Tiger.

A Skull.

This specimen (Pl. XLVIII. fig. 49) was taken from the skin of an animal called the Van Diemen's Land Tiger, presented to the Society by Dr. J. HENDERSON; and described in the 3rd vol. of the *Gleanings in Science*, by Dr. J. GRANT.

It was before described in the 9th vol. of the *Transactions of the Linnæan Society*, by HARRIS: and it is mentioned in the *Synopsis of Mammalia of GRIFFITH'S CUVIER*, under the name of *Dasyurus Cynocephalus*. Mr. BROOKS, as it is there stated, thought it the type of a new genus, to be named *Paracyon*: and M. TEMMINCK has since formed it into one, under the name of *Thylacynus*. In all these, however, the dentition is incorrectly given. In the *Linnæan Transactions*, and in the *Gleanings in Science*, the cheek teeth are represented as $\frac{6}{7}\frac{6}{7}$, and in the *Synopsis of GRIFFITH'S*, the dentary system of *Dasyurus* is attached to it, viz. incisors $\frac{3}{4}$; canines, $\frac{1}{1}$; cheek teeth, $\frac{6}{6}\frac{6}{6}$. So far as relates to the incisors and canines, GRIFFITH'S is probably correct; for, although some of the incisors are wanting in the present specimen, there are eight sockets above, and six below; the second on each side of the latter being situated apparently within the row of the other four, as happens to the middle incisors of BROOKS' genus *Lycaon*. The dentition of *Thylacynus* is therefore, incisors, $\frac{3}{4}$; canines, $\frac{1}{1}$; cheek teeth, $\frac{7}{7}\frac{7}{7} = 46$, and omitting the incisors, some of which are wanting in the present specimen, the teeth may be described as follows:

SUPERIOR MAXILLA—*canines* strong, large, and curved backward, with the points inclining rather inward; separated from the incisors by a deep, round fossa, or hollow, nearly half an inch in diameter, to receive the point of the opposing canine of the lower jaw. *Cheek teeth* gradually increasing in size to the last but one, which is the longest. The three anterior ones are compressed, cuspid, with a heel at the posterior side; but little developed in the first, more so in the second, and largely in the third, where it is formed into almost a sharp tubercle. The fourth, fifth, and sixth cheek teeth irregularly triangular, with the most obtuse angle forward and outward, and the most acute, backward and outward. The fourth tooth has a

tubercle at each anterior angle, the outer one having a point, forming a small heel before it ; a larger and sharper central process ; a very small additional point arising out of a concave surface between the central process and posterior angle ; and a curved, sharp, cutting edge extending along the inner and posterior side of the tooth, from the central process to the posterior angle. The fifth tooth is, in general appearance, similar to the fourth, but rather larger than it ; with the central process longer in proportion, with only a rudiment of the small point of the concave surface, and the posterior and inner cutting edge larger and sharper. The sixth tooth is the largest : the heel of the anterior tubercle is more strongly developed, and the outer and central processes are larger and sharper than in the other teeth ; the posterior interior cutting edge is very sharp, and there is scarcely a trace of the additional point. The seventh tooth is also triangular in its form, but with its longest axis placed cross-wise, with an obtuse anterior interior tubercle, another posterior one, and a third rather sharper than those in the centre, with a sharp elevated ridge extending across to the most acute angle at the outer side, uniting the central with a fourth tubercle at the outer angle.

With regard to the placing of the teeth in the jaw : the sockets of the four incisors on each side are close together, but between those of the two central incisors there is an interval of about $\frac{1}{10}$ th of an inch, indicating a corresponding gap between the teeth. Between the incisors and canines there is the pit in the intermaxillary bones already mentioned. The first molar is almost close to the canine of its side ; the second molar is separated by an interval of $\frac{2}{10}$ ths of an inch nearly, from the first ; the third molar is rather more than $\frac{1}{10}$ th of an inch from the second, and it adjoins the fourth, forming with it, the fifth and the sixth, a continuous series of four teeth, from which the seventh is separated by about $\frac{1}{8}$ th of an inch.

INFERIOR MAXILLA—*canines* strong, much curved, approximating at the base, then proceeding outward, with the points turned backward, and rather inward ; placed close to the incisors, which appear jammed between them ; and the points not going on the outside of the intermaxillary bones when the jaws are shut, but received into the fossa in those bones, between the upper incisor and canine teeth. *Cheek-teeth* gradually increasing in size to the third, than which the fourth is rather smaller ; and again, from the fourth to the last, which is the largest of all : first, second, and third, like those in the upper jaw : fourth, fifth, sixth, and seventh tricuspid, with an acute angular point in front, a very elevated sharp process, with cutting edges in the centre, and a tuberculous process behind. This last

process approaches to a grinding surface, with an acute margin at the outer and posterior sides, in the fourth, fifth, and sixth teeth; and it is of a rather round, tuberculous form, in the seventh tooth.

The first molar in the under jaw is placed close to the canine tooth of its side; the second is about $\frac{1}{6}$ th of an inch from the first; the third rather more from the second; and there is another space between the third and fourth of about $\frac{1}{6}$ th of an inch; the four last teeth form a continuous row.

The lower canines being received into pits in the intermaxillary bones, is somewhat like an approach to what takes place in some of the Saurian reptiles; and indeed, the whole view of the skull of *Thylacynus Cynocephalus* reminds the casual observer almost as much of a Saurian as of a Mammiferous animal.

When presented to the Society, the stuffed specimen was, as it is said, in a bad state; and when the present Curator entered upon his office, there was, owing to no care having been taken of it, nothing to be done, but to take out the bones, to preserve them. This, however, was so far fortunate, as it has led to the discovery of the real dental system.

Mr. GRANT, who drew up the paper in the "Gleanings in Science," proposed the name of *Lycoccephalus* for this species, apparently not aware that HARRIS had before named and described it. His mistake as to the number of teeth arose from not having been able to open the mouth far enough to allow him to examine them properly; and HARRIS's specimen may have been an old one, and lost a tooth on each side. The Society's specimen was of a middle age, rather young perhaps than otherwise: the bones of the skull being well knit together, though not fixed by bony union.

It is greatly to be wished, that some friend to the Society would present another specimen.

VII.—*Analysis of Copper Ore from Nellore; with notice of the Copper Mines at Ajmír and Singhána.* By JAMES PRINSEP, Sec. &c.

Through the kindness of Mr. C. A. KERR, I have had a further opportunity of examining the produce of the Nellore copper mines, of which cabinet specimens were presented to the Asiatic Society two years ago*, before the formation of the "*Indian Copper Mining Company*" at Madras, for the purpose of turning to profit the mineral stores of this promising district.

* See Proceedings of the Asiatic Society, Feb. 1833, in vol. ii. p. 95.

From a pamphlet published at Madras, we learn that the copper mines in the Nellore and Cuddapah districts were discovered about 40 years ago, by Mr. BENJAMIN HAYNE, whose report to Government, inserted in his *Tracts on India*, gives the fullest and most satisfactory account of them. From this pamphlet, we glean the following particulars of the locality, and of the quality of the ore.

“The districts on the coast in which copper ores have been discovered are those of the Calastray and Vencatagherry zemindaries, and the Udygherry Jaghire, in the zillahs of Nellore and Duppaud, and other places in the ceded districts.

“The principal mining places are at the distance of about 30 miles N. W. from Nellore, 30 miles from the sea, about the latitude of Rámapatam, and about 40 miles N. E. from Cuddapah.

“Several rivers run right through it on their way to the sea from the western hills, of which the Pillapeyroo, Vuppovagoo, and Manyroo form a junction not far from Guramanypenta, the principal mining place, and form a pretty large river, which is said to have a good deal of water throughout the year. Its beds are very stony, which seems in the eyes of the natives the greatest objection against its being made navigable for boats: it deserves therefore an accurate survey.

“The general aspect of the country is barren, and uncomfortable in the extreme: large trees are only found in and near the villages; and on the wide extended plains, on both sides of the river, nothing encounters the eye, but here and there a small thorny shrub. The grass, which, in the rainy season, every where else carpets the country with a refreshing green, is here both scanty and of the poorest kind, a species of “*aristida*,” which, as the name implies, is a compound of long beards or bristles. This is the case in most mining countries; the surface of the soil contains in many places so much salt, that the inhabitants could make enough, if allowed to do so, for their own consumption.

“To the eastward, the country is open; only here and there a few low hills are to be seen; but to the westward, there are ranges of hills, the nearest at the distance of about 10 miles. Due west is one called Malla-coudah, from being the highest hill in the range. It is said to abound with wood. The Udygherry mountains are to the south-west, about 16 miles, and the highest in this part of the country: the highest point I take to be about 3000 feet above the level of the low country: I have seen myself, that plenty and large wood grows there, particularly between the valleys.

“About 20 miles on the way to the sea, in the direction of Rámapatam, are extensive jungles, consisting of—1. Korra, *Panicum italicum*, L. 2. Aruga, *Paspalum tomentacium*, L. 3. Woolava, *Glycene tomentosa*, L.

“This country is, geologically speaking, of a primitive description; the general rock formation is a mica-slate, of different colors and consistence. It shews itself first in the low country, at the distance of about 15 miles east from the hills; it forms sloping mountains, which are often capped with horn-stone slate, which passes into sand-stone, and on the other hand, into jasper. The tabular summits and mural precipices of the Udygherry hills consist of the latter stone kind: the layers or strata of the mica-slate occur in different positions, and inclination to the horizon; often in the low country forming a right angle with it; on and about the Udygherry hills, the strata appear in the utmost confusion, as if thrust by force out of their proper position. Traces of copper ores are often found

in this rock, and it is generally known to contain various metallic veins, as gold, silver, and copper.

"Subordinate to the former is green-stone slate, in mighty layers, often as to appearance constituting the principal rock of a district for many miles. This is the case about Guramanyenta and the other mining places. The layers or stratification of the latter rock I have as yet always found in a horizontal position.

"The green-stone slate is often approaching to green-stone; it occurs then only obscurely slaty, has a jet black color, strong glossy lustre, foliated fracture, hard in a small degree; in this state it seems here barren of metals of any kind. The real green-stone slate is of a bluish black color, with small white spots of decomposed felspar, half hard; and when exposed to the air, it crumbles soon to pieces, and takes a green color. The rock is reckoned one of the richest '*mothers of ores*' of any in the world. In it are found silver and copper in rich beds or layers, as is the case here; but never in veins, as in other formations*.

"The layers of copper are of different thickness, and distances from each other: the general run of the pieces of ore, constituting the layers, is two inches in thickness; but they have been found also of several feet. The pieces are in general flat, as if compressed, and coated with ochre. The vertical distance between the layers is 4 to 8 feet, and the horizontal is even more uncertain.

"A corroded honey-combed quartz is found in great abundance in the green-stone slate, particularly along with the copper ore. It appears often on the surface, in such places where the water has washed the earth away. It looks then like indurated marl, which in other parts of the country is very common.

"The rock† is covered with a red coarse gravel, which is the superficial soil of this part of the country. In my opinion, this is formed from the decomposition of the green-stone slate, and its quartzose and ferruginous contents; for copper ore is often found in it in considerable quantity, and in the same situation, as in the slate rock.

"At Yerrapillay, in a new mine, which I opened, I found two layers of ore in it, at distances of four feet asunder.

"The thickness of this stratum of gravel differs according to its situation, whether it is on a high or low ground. I have found it from 4 to 6 feet, and more.

"The copper ore which Dr. THOMSON calls Anhydrous, the most common kind, is in flat pieces, externally, of a brown ochry color; internally, of a black iron color, which often passes into green; when moistened with water, it becomes almost immediately throughout green; in some places, it is bluish grey throughout. Lustre, in some places, where it is black, semi-metallic; and in the bluish grey, metallic‡. The copper indeed

* One of my specimens from Nellore is abundantly curious and interesting. It consists of distinct layers of the carbonate, alternating with black micaceous schist, or rather green-stone, affording exactly the appearance of gradual deposition from a liquid at this earliest period of geological formations. The angle formed by the strata of this striated rock with the horizon is stated by Mr. KERR to be about 45°.—J. P.

† See Dr. BENZA's observations on veins of quartz pervading decomposed pegmatite, J. A. S. iv. 421.—ED.

‡ This description accords so completely with that of No. 3, in the subjoined analysis, that I have no doubt Dr. HAYNE has mistaken the sulphuret for Dr. THOMSON's ore.—J. P.

is in an almost metallic state in it. Fracture approaching to even fine grained streak ; of the black, brighter metallic ; powder, "*greenish*;" not very hard, except the iron black and bluish grey part ; which is with difficulty scratched by quartz ; brittle ; not particularly heavy. Specific gravity, 3.09. Some pieces are found of a nut brown color, and some with conchoidal fracture. The foreign admixtures are various, as white and green quartz, mica, iron ore ; mountain blue and malachite are in some places found with it. In other places, I suspect the admixture of silver. For the analysis, I must refer to that of Dr. THOMSON, in a paper laid before the Royal Society of London, which I was permitted to publish as an appendix to my "*Tracts on India*." I will only mention here, that on an average, he procured 50 per cent. of pure copper. In the dry way, or by simply smelting the ore, we have received the metal in *greater proportion*, which may be easily accounted for by the quantity of iron, which the ore contains, that cannot be separated, as when the analysis is carried on by acids and other re-agents."

Mr. HAYNE seems to have been wrong in imagining, that the natives had only discovered these mines 50 or 60 years before (about 1750). Mr. KERR, who has since visited the whole of the mining district, and examined all the formations, and the old works, with great care, states, that the former excavations are of prodigious magnitude, many of them occupying several hundred feet square, and having a depth of 50 or 60 feet. The matrix rock and rubbish are now accumulated in these immense tanks ; but on clearing them away, the mouths of the galleries extending into the rocks were discovered ; blocks of the ore, (perhaps some that had been gathered previous to the discontinuance of working the mines from some political convulsion or oppression,) have been used to mend the village tank at *Guramanyenta* ; and Mr. KERR imagines, that any quantity of the richest ore* may be obtained at a trifling expence, and within 100 feet of the surface. Extensive hills, formed of lumps of ferruginous slag, now covered with vegetation, point out the situation of the ancient smelting houses. A piece of this slag (which was at first mistaken for a volcanic product) was analysed by myself. It yielded but faint traces of copper, shewing that the native processes of extraction, however rude, were effectual in completely separating the metal. But I must now proceed to observe upon the actual specimens of the ore submitted to my examination, purposely avoiding all allusion to the mercantile value of the mines, the estimates of the expence of working them, and the invitations to join in an association for this purpose :—objects which are highly interesting to the community, connected with so laudable a measure for developing the natural riches of

* The "steel-grained, crystallized silvery ore, invariably found in green-stone slate, and partly imbedded in quartz, the richest ore met with," is doubtless No. 3, the sulphuret.—J. P.

the country; but which cannot with propriety be entered upon in a work devoted exclusively to literature and science.

The ores now presented to me are from three different localities. They differ considerably in quality one from the other, and all from the former ore, which Dr. THOMSON pronounced to be an anhydrous carbonate, new to mineralogy.

No. 1. A parcel, weighing 90 lbs. of roughly-picked and cleaned ore, has a quartzose matrix, in some parts colored green, or appearing so from the malachite beneath the transparent crystal. It contains much iron, which, on solution in an acid, appears in the form of a yellow ochre. Ten per cent. of quartz was separated from this specimen on pounding it roughly, before setting it apart for analysis.

No. 2. A parcel of the same weight is labelled "*Bungeral Mettah*," and is the species stated to be found in clustered nodules in the alluvium, of rounded exterior, as though they had been detached from their original site, and reburied here. The ferruginous matrix of this ore, on solution, assumes the appearance of a dark-red oxide. It is the same probably as that of Dr. THOMSON's specimen. The carbonate of copper runs through it in veins, but the mixture of sulphuret of iron and perhaps of copper with the oxide, gives the whole a dark arenaceous texture.

No. 3. The richest ore of the three is at the same time the most abundant, and promises to yield the safest return, as it runs in unbroken veins. This ore is a combination of carbonate and sulphuret, the former intermixed with the latter, but readily distinguishable from it, as the sulphuret is crystallized, and has the grey metallic lustre of galena. The specific gravity of this ore is 3.77, being intermediate between that of the carbonate, 3.2, and the sulphuret, 4.5.

The analysis was conducted for the sake of expedition on separate parcels of 100 grains each, in lieu of attempting the separation of the ingredients from a single parcel. Some variation may thus be induced from the irregularity of the ore; but, on the whole, the results ought to be more trust-worthy. Thus: the carbonic acid was estimated by the loss of weight on digesting 100 grains, finely pounded, in dilute nitric acid. The water, (for none of these ores was found to be anhydrous,) by heating in a glass tube, removing the aqueous vapour by bibulous paper, and ascertaining the loss. As the ore generally lost its green colour by this operation, it is possible that a portion of carbonic acid was also driven off. Calcination in an open dish, in the muffle of an assay furnace, gave a loss, which was compounded of that of the carbonic acid and the water. Calcination drives off the sulphur also, but the equivalent of oxygen, which replaces it, being of precisely

equal weight, this operation affords no test of the quantity of sulphur present.—In fact, not expecting from Dr. THOMSON'S analysis, to find sulphur in the Nellore copper ore, I at first neglected the precautions necessary for its separation. This was accordingly effected on other samples, by boiling in strong nitric acid, which, from its heat, caused part of the sulphur in a pure state to rise in fused globules to the surface : while a portion, being oxygenated, was afterwards separated by precipitation with barytes.

The quantity of copper was most conveniently estimated from the black oxide taken up from the calx by dilute nitric acid. It was also obtained directly from other samples by reduction of the oxide with charcoal and borax.—The iron and pyrites were deduced from the difference between the residue in the cold solution, and that from the hot dissolution in strong acid of another parcel, before calcination.

Collecting together the results of the above operations, we have the following data, whence to deduce the composition of the three specimens.

	No. 1.	No. 2.	No. 3.
a. Loss of carbonic acid by digestion in dilute nitric acid,	12.0	14.6	7.0
b. Loss of water (and some carb. acid ?) by heating without air in a glass tube,	5.0	7.0	3.0
c. Total loss on calcination with access of air,	17.5	17.8	21.0
c2. Ditto average of two other trials (more carbonate,)	20.0	20.3	23.5
d. Oxide of copper taken up from calx c by dilute acid,	37.7	49.2	73.7
e. Residue of insoluble earths and ox. iron, after d,	44.8	33.0	5.3*
f. Residue from digestion of crude ore in boiling nitric acid,	20.0	13.9	19.0
g. The same, after burning off the sulphur and redigesting in do.	20.0?	8.5	0.0
h. Sulphur, separated on boiling in strong acid,	0.6	2.1	9.0
i. Sulphate of barytes precipitated afterwards,	1.4	17.8	28.5
k. Weight of metallic copper actually recovered from c2,	28.5	52.2	59.0

In regard to d, No. 3, it was observed on digestion in cold nitric acid, that a very considerable portion of the calx of copper was of a red color, or in the state of protoxide, or perhaps in a metallic state, and was not taken up without disengagement of nitrous gas ;—the weight 73.7 must therefore be increased, to give the true weight in terms of the peroxide. This is also proved by the amount of loss in c, 21.0, which is considerably in excess ; and it was remarked on removing the calx from the fire that it was agglutinated, so as per-

* This residue may have consisted partly of sulphuret of copper that had escaped decomposition in the fire ; for another specimen was wholly soluble, and little iron was present in the solution.

haps to have prevented the access of air to oxidate the interior.—The sulphur enables us to approximate the correction of this item; for 12.8 requires 51.5 copper, = 64.3 black or peroxide; and this, added to 22.8, the peroxide of the carbonate, would give 87.7; which is 14.0 greater than the actual return from the fire.—Again, deducting the deficiency after calcination (*c.*) 21.0, from the sum of the three volatile ingredients—sulphur, 12.8; carbonic acid, 7.0; and water 3.0 = 22.8, there remains but 1.8 for the weight of oxygen absorbed in place of the sulphur; whereas 12.8 are required.—Adding the difference 11.0 to *d*, we shall have 84.7. This number will be found to be a little in defect from the subsequent results; while 87.7 is a little too great; a mean may therefore be adopted.

From the above data, we may now proceed to extract the simple elements of each specimen of ore:

	No. 1.	No. 2.	No. 3.
<i>l.</i> Metallic copper, calculated from the oxide <i>d</i> ,	30.2	39.5	69.0
<i>m.</i> Pure sulphur, from <i>h</i> and <i>i</i> ,	0.8	4.5	12.8
<i>n.</i> Carbonic acid, less $\frac{1}{10}$ th for hygrometric moisture,..	10.8	13.1	6.3

The carbonic acid being supposed to be wholly combined with copper, while the sulphur may be partly united with iron, we may calculate the proportions of the carbonates and sulphurets by means of the scale of chemical equivalents, thus:

	No. 1.	No. 2.	No. 3.
<i>o.</i> The carbonic acid will require copper,	31.4	38.6	18.3

Now in the first two of these, the copper required so nearly agrees with the calculated weight of metal, *l.* that the latter may be looked upon as existing here wholly in the form of carbonate, and the sulphur as united entirely with iron*. In No. 3, however, we find that the majority of the copper remains; and knowing the nearly total absence of iron in this specimen, we may conclude it to be a mixture of nearly two parts sulphuret, with one of carbonate.

The miner would rest content with the determination of the pure metal in the ore, and would have good reason to be satisfied with the 60 per cent. "actual yield" of No. 3, or even with the 30 per cent. of the poorest of the three ores; but the mineralogist will prefer an exhibition of the component salts of the ores, according to the usual synthetical formula. I may here remark, that the water separated (*b*) is more than is required to convert the carbonate into a hydrate or ordinary malachite: thus,

* In the second Analysis of No. 2, however, the copper actually recovered, *k*, so much exceeds this quantity, that it is evident this ore frequently contains sulphuret, or is of very variable quality.

	No. 1.	No. 2.	No. 3.
<i>p.</i> The copper combined with carbonic acid being, ..	30·2	39·5	18·3
<i>q.</i> will require water to hydrate it,	4·2	5·5	2·6

The excess in *b* may have been carbonic acid, partially driven off.

The chemical composition of the three minerals may therefore be thus expressed:

	No. 1.	No. 2.	No. 3.
Hydrated carbonate of copper,	52·4	68·5	31·7
Sulphuret of copper,	0·	0·?	63·0
Sulphuret of iron,	2·1	12·4	0·0
Oxide of iron, silex, &c.....	43·5	25·1	5·3
Loss or excess,	2·0	—6·0	0·0
	100·0	100·0	100·0

The excess in No. 2, is doubtless owing to the irregularity of the rocky admixture in different specimens, whereof one yielded 44, and another only 13·9 of insoluble matter, on digestion in acid.

The richness of the last of the three minerals will more than compensate for the increase of trouble and expence in the reduction of the ore by successive roastings; and practical miners assert, that the glance or grey sulphuret is a much steadier and more plentiful ore than the carbonate.

I should add, before concluding the above imperfect analysis of the Nellore copper ores, that I tested them in vain for silver and other metals. Neither did arsenic appear to be present.

I may here mention, that among the specimens of minerals presented to me by Mr. KERR, as occurring within the copper mining district, associated with the micaceous schist, are the following; corundum and adamantine spar, garnets, dark-green actinolite, red chalk, manganese; besides carbonate of magnesia, and other minerals of which specimens have not yet reached me. An ore of mercury is also suspected to exist in the same range of rocks. The surface of the gneiss or micaceous schist, where exposed to the air, is frequently seen tinged of a green colour, from the trickling of water holding carbonate of copper in solution, through crevices of the rock.

Copper Mines of Singhána, in the Shekawatí country.

I take this opportunity of acknowledging the receipt of further specimens of the ores of these mines from Colonel STACY.—They consist of the yellow and grey sulphurets, carbonates, and the blue native sulphate in deliquescent crystals. The latter is probably produced from the pyrites; as is the sulphate of iron from its sulphuret. Both of these occur also at Singhána: the sulphate, from its different tints, having the native names of *píla* and *hara kasís*, or yellow and green vitriol. There is also among the specimens a *mungya*

kasís, which appears to be a compound of alum, and the sulphates of iron, and copper. There are two very beautiful specimens of virgin copper in mammellated concretions, coating oxide of iron, which appear to have been formed by a natural decomposition of the blue soluble sulphate on coming in contact with the iron ore.

A full description of the Singhána mines, and the mode of extracting and working up the ore, (by Captain BOILEAU, of the Engineers ?) is printed in the third volume of the *Gleanings in Science*, page 380. It does not appear from that notice, that any previous roasting of the ore is resorted to ; but instead of this process, the ore is ground to a fine powder, formed into cakes with cow-dung, then burnt in a " clamp," and lastly, mixed with scoria of iron to be blasted. The iron in this operation, deoxidated by the charcoal, doubtless assists in removing the sulphur from the copper by its superior affinity. The metal produced from these mines is, however, not thoroughly refined ; but according to Captain BOILEAU, is brittle, and of a lilac colour : while that of *Basáwar* in the *Bhartpur* district, (most probably a carbonate) is at once melted down into a fine malleable metal—but on the other hand, the latter is too poor an ore to be worked profitably.

The extent to which the *Shekáwatí* mines have been worked in former ages of Hindu prosperity is fully equal to that we have seen of the *Nellore* mines, and strikingly similar in every respect. "The scoræ, or *khangar*, that have been accumulating for ages, have at length formed a line of small hills, several hundred feet in length, and from thirty to sixty feet high : there are four insulated stone bastions built on ore of these artificial mounds. The rocky ridge in which the excavations have been carried on for generations is pierced by numerous shafts, giving access to the galleries, by which the hills are honey-combed in every direction to the length of a *kos*, if the natives are to be believed." But I must refer to the article whence these paragraphs are quoted ; for the whole account will be read with interest.

I am in expectation of further specimens of the *Shekáwatí* minerals from Mr. DEAN.

Ajmír Copper Mines.

A new locality of copper ore has recently been brought to notice by Captain C. J. DIXON, in the neighbourhood of *Ajmír*, where three different shafts have been opened. Specimens of the ore extracted thence were forwarded to me by the present Governor General, along with a copy of the report from Captain DIXON, on the subject, dated 8th May, 1835, from which I extract the following particulars :

“The *Ajmír* ore in mineralogical phraseology is ‘termed a ferruginous red oxide of copper,’ and being free from sulphur, two operations are sufficient to metallize it ; one smelting, and one refining. The ore in *Shekúwatí*, as well as the principal ores worked in Cornwall and Wales, are sulphurets, copper pyrites. They require successive calcinations, roastings, and smeltings ; eight separate processes being essential to perfect metalisation. At the same time, that our operations are conducted with celerity, and consequently at a comparatively small outlay ; inasmuch, that the ore, on the third day after it has been dug from the vein, is reduced to a metallic state, adapted for sale ; (while in Europe calcination alone occupies several months,) the business of smelting is wholly free from that noisomeness, so injurious to health, which characterises works of this nature at home, when sulphur forms an ingredient in the chemical composition of the ore.

“The first vein was opened near *Gúgra*, four miles N. N. East of *Ajmír*. It runs north and south, and its breadth varies from a span to four inches. It is situated on the plain, within one hundred and fifty yards from the range of hills ; its greatest depth being sixty feet from the surface. An admixture of ores from separate veins is essential to a complete fusion ; and with this intention, a vein was sought and opened at *Rójgarh*, twelve miles S. S. West of this. This vein, also on the plain, but near the hills, is only twenty-five feet from the surface, while a third has been opened, within the last fifteen days, near *Rajáurí*, ten miles south of *Ajmír*. The presence of copper has been detected at other spots : indeed, it is beyond doubt the whole of the *Ajmír* valley is traversed by veins, which run from *Kishengarh* to *Rájgarh*, a distance of thirty miles ; industry and capital being the sole requisite to their complete development. In Cornwall, good veins are not met with, until attaining a depth of three hundred feet and upwards. At present, our labours are confined almost to the surface. The transmission of these specimens will, I hope, prove so far useful, that should the Honorable the Governor General be pleased to make them over for analyzation to some scientific gentleman in Calcutta, their intrinsic value as ores will be ascertained ; for though the studies of the laboratory be as widely different in their issues from the labors of the furnace, as theory is from practice, still a favorable result in the former will be highly satisfactory, and may at a future period warrant the establishment of the works on a large scale. In exemplification of the observation in reference to theory and practice, various specimens treated in the study yield from twenty to eighty per cent., while the average produce of the mines in Cornwall for some years past has ranged from eight and a quarter to

ten per cent. of metal. The reason is obvious. In the small way, assorted specimens are selected, and by proper care and attention to their treatment, every particle of metal is recovered. But in the large way, in the smelting furnace, rich and poor ores with a good deal of extraneous matter incorporated therewith are fused together. Hence the result of the furnace always falls short of the issue of experiments in the study."

Captain Dixon is quite correct as to the fallacy of trusting to the results of the laboratory in regard to the average produce of mining operations. The nature of the ore, and of its associated minerals, is all that the chemist can pronounce upon. In this respect, the *Ajmír* ores, like those of *Bhartpur*, hardly offer much encouragement: none of the specimens, small as they are, consist of homogeneous ore, but are in general, merely coatings of carbonate on a ferruginous matrix, or veins in quartz and a micaceous schist. It is probable, however, that small cabinet specimens would be selected for this very object of shewing the connection with other rocks, and that far richer lumps are taken to the smelting house.

The ore from *Rájgarh*, twelve miles S. S. W. of *Ajmír*, is accompanied with slender prismatic crystals of selenite, of black augite, hydrated red oxide of iron, and carbonate of the same metal. There are also veins of an aluminous or silicious malachite, which may be termed *turquoise copper ore*; it is of a fine blue colour, translucent where thin, breaking with conchoidal fracture, and apparently capable of being converted to ornamental uses. It differs from the turquoise*, in being insoluble in acids, which take up only the green colouring matter, a carbonate of copper. I have not further analysed this curious mineral. At *Rájauri*, ten miles S. W. of *Ajmír*, the carbonate is of a lighter colour, more earthy, and accompanied with small yellow scales of mica and iron. At *Gúgra*, four miles N. N. E. of *Ajmír*, the malachite is associated with carbonate of lead, a micaceous carbonate of iron, and with a rich galena or sulphuret of lead. Yellow copper pyrites also shews itself, and earthy veins of a pale blue, very similar to some of the streaks in the turquoise rocks of *Nishapur*, in Persia. It is possible that this mineral itself might be met with, on farther search, if felspar or other aluminous minerals exist in the *Ajmír* hills: the matrix of the turquoise is also a red iron clay ore, very similar to that of the copper mines.

* See analysis of this mineral in the *Gleanings in Science*, ii. 375.

VIII.—*Proceedings of the Asiatic Society.**Wednesday Evening, the 4th November, 1835.*

Captain PEMBERTON, Senior Member present, in the chair.

The Hon'ble Sir BENJAMIN MALKIN, Kt., and CHARLES HAY CAMERON, Esq., proposed at the last meeting, were ballotted for, and unanimously elected Members of the Society.

Read a letter from Lieut. W. C. BAKER, acknowledging his election as a member.

Read a letter from THOMAS DICKENSON, Esq., Secretary Bombay Branch of the Royal Asiatic Society, acknowledging the receipt of a copy of the Index to the Asiatic Researches.

Read a letter from CHARLES KONIG, Esq. Foreign Secretary to the Royal Society of London, acknowledging the receipt of a copy of M. CSOMA DE KÖRÖS's Tibetan Grammar and Dictionary.

Library.

The following books were presented:

Proceedings of the Geological Society of London, No. 39—*by the Society.*

Madras Journal of Literature and Science, No. 9, October 1835—*by the Madras Literary Society.*

A Treatise on the manufacture of Saltpetre, descriptive of the operations and proper plans to be used for the manufacture of Culmee and Cooteah—*by Mr. J. Stephenson, and presented by him.*

The Indian Journal of Medical Science, No. 23—*by the Editors.*

Meteorological Register for September, 1835—*by the Surveyor General.*

The following books were received from the Oriental Translation Fund:

The Chronicles of Rabbi Joseph Ben Joshua Ben Meir, the Sphardi. Translated from the Hebrew *by C. H. F. Bialloblotzky*, vol. I.

Miscellaneous Translations from Oriental languages, vol. 2nd.

Les Aventures De Kamrup, par M. Garcin De Tassy.

Harivansa, or Histoire de la Famille de Hari, part 1st—*by M. A. Langlois.*

Ethiopic Didascalia, or the Ethiopic version of the Apostolic Constitutions received in the Church of Abyssinia, with an English translation—*by Thomas Pell Plat, Esq., F. A. S.*

Nipon o Dai itsi Ran, ou Annales des Empereurs du Japon, 1 vol.—*by M. J. Klapproth.*

Lardner's Cabinet Cyclopedia, Swainson's Animals.

A piece of ancient Hindu Sculpture, representing a female (goddess), with a child, walking, dug up in the ruins of Canouj, was presented by Colonel STACY.

Literary.

Read a letter from W. H. MACNAGHTEN, Esq., Secretary to Government, Political Department, forwarding on behalf of the Honorable the Governor General of India in Council, a copy of notes taken by Captain WADE, relative to the territory of Iskardoh, and of his correspondence with the ruler of that country.

A memoir on the mountain tribes, on the extreme N. E. frontier of Bengal, by J. MCCOSH, Civil Assistant Surgeon at Goalparah—*presented by the Author.*

Extracts from both these papers were read.

Physical.

The following extract of a private letter from Captain CAUTLEY to the Secretary was read, noticing the discovery of further fossils in vast quantity in the Sewalik range.

"A trip to the Sewálíks, near the Pinjore valley, lately, has introduced us to the *Anoplotherium*?* in a perfect line of six molars on one side, and four ditto in the other side of upper jaw. I say *Anoplotherium*, for the rear molars have the distinguishing mark in the insulated mamilla pointed out by CUVIÉ†, as that which distinguishes the *Anoplotherium* from the *Palæotherium*, although the position of the molar bone, part of which is distinguishable, appears to differ from that of the former animal, and gives it a greater resemblance to the *Palæotherium*; this is a beautiful fossil, and dug out: but I must give you a history of the last week.

"I had to visit Dádúpur on canal matters, and found both BAKER and DURAND as eager as myself for a short excursion into the Sewálíks; and as all our parties were out, we determined on visiting those most westerly, who were working at a village called Moginund (a common name apparently) in the Rangurh district, about 50 miles W. of Dádúpur: our route took us through Sidaura, Naraingurh, Mír ká Gurhí, Rangurh, to the village of Moginund, which lies in a nook of these little hills, open only on the west: here we remained three days, returning to Dádúpur by regular marches, and visiting Khet Púrali, another little, village close under the hills on our way, as near this village is a stratum of a clay conglomerate, or marl full of testaceous remains chiefly Bivalves (varieties of *Unio*,) reptiles, and fish; of the former, you have already specimens, and with the latter, you shall be provided in due course. The country on this route was open and well cultivated, rice in great abundance, and cultivation of all sorts up to the foot of the hills. These hills differ much in appearance from those between the Jamna and Ganges; the abruptly scarped precipices, and mural cliffs, with the huge strata of shingle, are here replaced by a comparatively low series of undulating hills, consisting of an eternal succession of sands and clays, with here and there beds of a coarse sandstone, or fine shingle conglomerate, accessible at all points excepting those where slips have taken place, and free from jungle and high vegetation, excepting in hollows, and the lines of ravines skirting the tributaries to the main outlets of drainage.

"The hills were covered with fossils like all the others (how they could have escaped observation before, must remain a source of wonder). Mastodons and hippopotamus's remains looking one in the face at every step! Amongst the remains collected were those of the *rat* and *porcupine*, too perfect to admit of any doubt. The specimens of each consisting of the *palate*, with the two lines of *molars*!! Although three days at this place, and superintending my digging parties, I must confess my inability to decide strictly whether we were working in a *stratum* or in *debris*: this may appear strange to a person who has been unaccustomed to examine and decide on the position of strata, but will be understood and appreciated I imagine by any one who has had his attention strictly brought to bear upon the point. Shrubs, inequalities of surface, ravines, et hoc genus omne, all and each of them battling every inch! I am however inclined to consider that we had both, and that we were working in both a soft sandstone stratum, and also in a superficial coating of debris. A great number of perfect bones, the whole series of a leg for instance, jaw bones, and other remains were fairly found and dug out from the rock; at other places, huge masses of hard rock were found imbedded in the softer rock or soil, the said masses consisting in most cases of agglutinated bones: the shape of these masses give an appearance of their having fallen *formerly* from some parent rock, and being *now* found as debris; but the circumstance of finding the connected joints of animals is altogether in favor of the excavation being in the stratum in which they were originally deposited. The question does not appear to me of much consequence, as the bones are not rounded by attrition, and are as sharp and perfect in their form and outline, as when belonging to the living animal, although frequently broken, and jammed together, as would be the case in a skeleton or a mass of bones being forced together in an upheavement of the country upon which or in which they were collected.

"I may remark that our excavation was not on the outcrop of the strata, but in the slope, and the working parties were successful in their operations at many points on the whole surface of that side of the mountain. This deposit appears to be altogether wanting in the mastodons, reptiles, and hippopotami: the remains at present dug out consist of portions of *anoplotherium* or *palæotherium*, rhinoceros, hog, horse, ruminants of the most gigantic dimensions, with those of the smaller classes, carnivora, hyæna, canis, tiger (or lion), and a small species of a feline animal, a very perfect cranium of which is in the possession of Lieuts. DURAND and BAKER. Many

* This fossil is either the *Anoplotherium*, or a new variety of the *Palæotherium*, and if it was not for the insulated mamilla, referred to, its classification amongst the latter genera would, I suspect, be undoubtedly correct. The discovery of more perfect remains of the head, will settle this point at once.

† Volume iii. p. 21. Ossements fossiles.

of the bones of these animals are coming out perfect, and some have been found, as I before mentioned, in connected joints!

"With reference to the Sivatherium, I regretted much my inability to obtain the dimensions of one of the most superb fossils, I suppose that ever was found; it was unfortunately discovered and excavated by a party of work-people employed by a gentleman with whom I was unacquainted, and although I saw the fossil when in the rock, I was prevented from getting the measurements afterwards. This specimen consisted of the femur and tibia, with the tarsal, metatarsal, and phalanges of one of these gigantic ruminants that time and patience will and must introduce us to! In the bones of all the animals discovered, there are differences from those of their existing congeners that will be pointed out hereafter; it may be sufficient here to advert to the fact. The teeth that are found at this spot are beautifully perfect, and from the softness of the matrix or rock in which they are imbedded, easily cleared and exhibited. There is an evident grouping of animals throughout! The hippopotami, mastodons, &c. which in some localities are in such abundance, are in others wanting; their place being occupied by carnivora, ruminants, &c. The testaceous remains as yet found have been accompanied by reptiles and fish. We have in fact an extended tract of country upheaved, and the different groups as might be expected in their natural habitats!! It is hardly a month since I attempted, in a note on the Gavial of these hills, to enumerate the probable proportions of animals that existed on this tract! During this short period, we have added another family, Rodentia, to our catalogue, and another genus of the Pachydermata, besides the splendid additions to our former list in the further elucidation of those already found, in the discovery of more perfect specimens of bone, especially of the horse, rhinoceros, and the larger ruminants!! You will join with me in an exclamation, which has been upon my lips, day after day, since the discovery of the first fragment of bone—'What shall we have next?'"

1. A small, but splendid, collection of stuffed birds, presented by Captain PEMBERTON.

As they were received only the same morning, the Curator deferred his report until the next meeting.

2. A species of *Pteromys*, presented by Captain DAVIDSON, from Goalparah, Assam.

3. A collection of Mammalia and Birds from Goalparah, Assam, presented by Dr. McCOSH. The collection consists of the following specimens:

Mammalia.

- 1.—*Mungusta Mongoz*.
- 2.—*Pteromys*.
- 3.—*Moschus Memina*.
- 4.—*Moschus Memina*—(Skeleton).

Birds.

- 1.—*Alcedo Bengalensis*.
- 2.—*Dicrurus Cærulescens*.
- 3.—*Turdus Saluaris*.
- 4.—*Oriolus Melanocephalus*.
- 5.—*Eudynamis Orientalis*.
- 6.—*Buceros Homrai*.
- 7.—*Buceros Malabaricus*.
- 8.—*Garrulus Bengalensis*.
- 9.—*Polypleitron Hardwickii*.
- 10.—*Phasianus Gallus*—2 male and 1 female specimens.
- 11.—*Phasianus Lineatus*.
- 12.—*Gallinule Porphyris*.
- 13.—*Fuligula Caryophyllacea*.

The *Buceros Homrai* is considerably larger than the one described by Mr. HODGSON in the 2nd part, 18th vol. Researches of the Asiatic Society. From tip of the bill to tip of the tail, Dr. McCOSH's specimen measures five feet two inches; that of Mr. HODGSON's is only four feet 5½ inches in length: and by comparing the bill and casque with two of the Nipal bird, in the cabinet of the Curator, the inferior size of the latter is very apparent. There is, belonging to Captain PEMBERTON, a specimen now upon the table, of the bill and casque of the same bird, from Chittagong, even larger in size than that from Assam.—CUR.

Meteorological Register, kept at the Assay Office, Calcutta, for the Month of October, 1835.

Day of the Month.	Observations at 10 A. M.										Observations at 4 P. M.										Register Thermometer Extremes.		Wind.		Weather.
	Standard Barometer, at 32°.	Wet Barometer, at 32°.	Aqs. Ten. deduced.	Thermometer in air.	Diff. or M. T. Depress.	Leslie's Diff. Hygrom.	Hair Hygrometer.	Standard Barometer, at 32°.	Wet Barometer, at 32°.	Aqs. Ten. deduced.	Thermometer in air.	Diff. or M. T. Depress.	Leslie's Diff. Hygrom.	Hair Hygrometer.	Cold on roof.	Heat in sun.	Rain.	Morning. 10 A. M.	4 P. M.	Day-light.	10 A. M.	4 P. M.			
1	29.449			87.5	7.7			.733		92.4	12.6				79.5	122.0		o.	o.	clear.	clear.	do			
2	.407			87.0	9.6			.690		93.3	16.3				79.8	127.8		n.	W.	do	do	do			
3	.775			86.3	9.0			.679		91.5	15.2				77.8	129.2		n.	o.	cum.	cum.	do			
4	.438			85.5	7.3			.769		89.4	6.0				78.2	108.9		e.	S.	do	do	do			
5	.683	28.692	1.191	86.5	4.4	4.9	95	.769	.547	1.222	85.5	4.9	5.2	94	76.6	111.1	.25	e.	se.	do	do	do			
6	.656	.647	1.200	84.1	5.1	4.6	95	.758	.589	1.169	84.6	6.2	5.4	93	76.0	113.6		e.	se.	do	do	do			
7	.842	.686	1.156	84.1	3.6	3.6	97	.716	.494	.910	85.3	5.4	5.2	95	75.2	123.2		o.	W.	c. c.	do	do			
8	.834	.648	1.186	84.5	5.2	5.2	93	.714	.498	.916	85.5	7.4	7.9	86	75.0	125.2		n.	NE.	clear.	fine.	do			
9	.838	.646	1.182	84.5	7.2	7.4	87	.714	.496	.921	85.9	12.1	12.1	73	74.0	125.5		NW.	N.	do	fair.	do			
10	.796	.629	1.167	83.0	8.8	8.7	85	.712	.408	.904	86.7	12.0	11.7	76	74.0	119.5		sw.	W.	fog.	clear.	do			
11	.847			83.0	9.7		87	.751		.85.2	16.6				74.0	130.0		nw.	o.	do	fine.	do			
12	.892	.608	1.194	84.7	7.2	7.7	87	.778	.540	.230	86.0	8.3	8.3	85	73.5	120.2		nw.	nw.	do	do	do			
13	.836	.638	1.198	84.8	6.9	6.9	87	.722	.472	.250	86.3	9.7	9.6	83	74.2	125.0	.60	NW.	NW.	cir. cum.	hazy.	do			
14	.816	.504	1.232	85.8	6.8	7.3	88	.680	.402	.278	87.0	9.0	7.0	76	76.8	115.2	.25	ne.	ne.	cir.	overcast.	do			
15	.780	.558	1.222	85.7	5.8	5.6	94	.676	.397	.279	87.0	7.0	6.2	93	76.0	114.0		E.	ne.	do	hazy.	do			
16	.731	.458	1.238	85.6	5.8	5.1	94	.625	.312	.313	87.7	8.0	8.3	87	75.1	112.1	.65	E.	e.	do	clear.	do			
17	.715	.470	1.249	86.1	6.5	5.4	93	.622	.396	.226	86.7	7.4	9.1	91	77.3	112.1		o.	nw.	cum. cir.	overcast.	do			
18	.744	.642	1.000	82.0	4.5	4.4	96	.670	.470	.170	84.4	7.2	4.6	96	76.2	86.4	3.30	SE.	se.	rain.	gather.	do			
19	.722	.630	1.026	82.6	3.6	3.0	98	.634	.428	.213	85.4	6.6	5.8	93	76.0	98.2	.10	S.	sw.	cum. str.	do	do			
20	.739	.636	1.102	80.4	4.4			.633		.81.3	8.1				75.6	110.5		S.	e.	cum.	rain.	do			
21	.732			81.3	4.3			.632		82.0	8.3				75.7	116.2	.05	N.	o.	fair.	do	do			
22	.729			79.5	3.6			.606		83.7	6.0				75.7	107.5	.75	o.	N.	cum. str.	rain.	do			
23	.701	.657	1.125	82.7	3.8	3.8	98	.704	.572	.132	83.7	5.0	93	75.0	113.7		N.	N.	clear.	clear.	do				
24	.683			80.0	9.4										75.0	119.5		NW.	N.	do	cum. str.	do			
25	.823	.844	1.071	80.9	8.9	9.3	80	.827	.697	.130	82.5	10.8	9.5	81	68.7	120.6		NW.	N.	do	cir.	do			
26	.927	.898	1.041	80.2	9.0	8.0	85	.822	.698	.124	82.3	9.7	8.7	83	68.5	126.5		NW.	N.	do	fine.	do			
27	.939	.874	1.045	80.1	8.3	8.0	86	.798	.676	.122	82.4	11.1	10.1	81	67.6	126.2		NW.	NW.	do	fair.	do			
28	.919	.874	1.045	80.6	9.0	8.7	83	.808	.697	.111	82.3	10.0	79	68.4	126.2		NW.	NW.	do	do	do				
29	.894	.836	1.058	78.5	11.0	10.7	81	.791		.81.2	12.3				70.3	124.0		N.	N.	do	hazy.	do			
30	.908			79.5	10.3			.759		81.5	15.5				74.0	127.6		N.	N.	do	do	do			
31	.911							.759																	
Mean	29.426	28.690	1.155	83.3	6.8	6.2	91	.707	.515	1.207	85.1	9.2	7.7	95	74.4	117.0	5.95	North monsoon set in.				One storm on the 18th.			

Instruments the same and placed as usual.

